Devoted to
TEXTILE
CHEMISTRY
BLEACHING
DYEING
PRINTING
FINISHING

AMERICAN DYESTUFF REPORTER

JULY 14, 1947
VOLUME 36, No. 14

JUL 21

OFFICIAL PUBLICATION
of the
PROCEEDINGS
AMERICAN ASSOCIATION
OF TEXTILE CHEMISTS
AND COLORISTS

"Pontamine"*
FAST RED 7 BNL
Suitable for all forms of cotton and viscose rayon. Good to very good light, dry cleaning and wet fastness when dyed on rayon . . . good resistance to sunlight, dry cleaning, and perspiration when dyed on cotton. Exhausts well . . . level dyeing . . . very good solubility. Animal fibers in mixed-fiber combinations are left practically unstained at lower temperatures. E. I. du Pont de Nemours & Co. (Inc.), Dyestuffs Division, Wilmington 98, Delaware.
*Reg. U. S. Pat. Off.
Du Pont Dyestuffs
DU PONT
BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY

extremely fast to light and washing on nylon

Supernylite

Reg. U. S. Pat. Off.

fast dyes for nylon

light fastness

medium shades, 40 to 300 hours

wash fastness

140° F. to 180° F.

Dye Fast Unions on Nylon and Wool
Dye Fast Unions on Nylon and Rayon
or Cotton in combination with SUPER-
LITEFAST direct dyes.

Extremely level dying in all percentages, for pastels and heavy shades on piece goods, yarns, etc

ALTHOUSE
Chemical Company
READING · PA.

Capturing Rainbow Hues is our Business

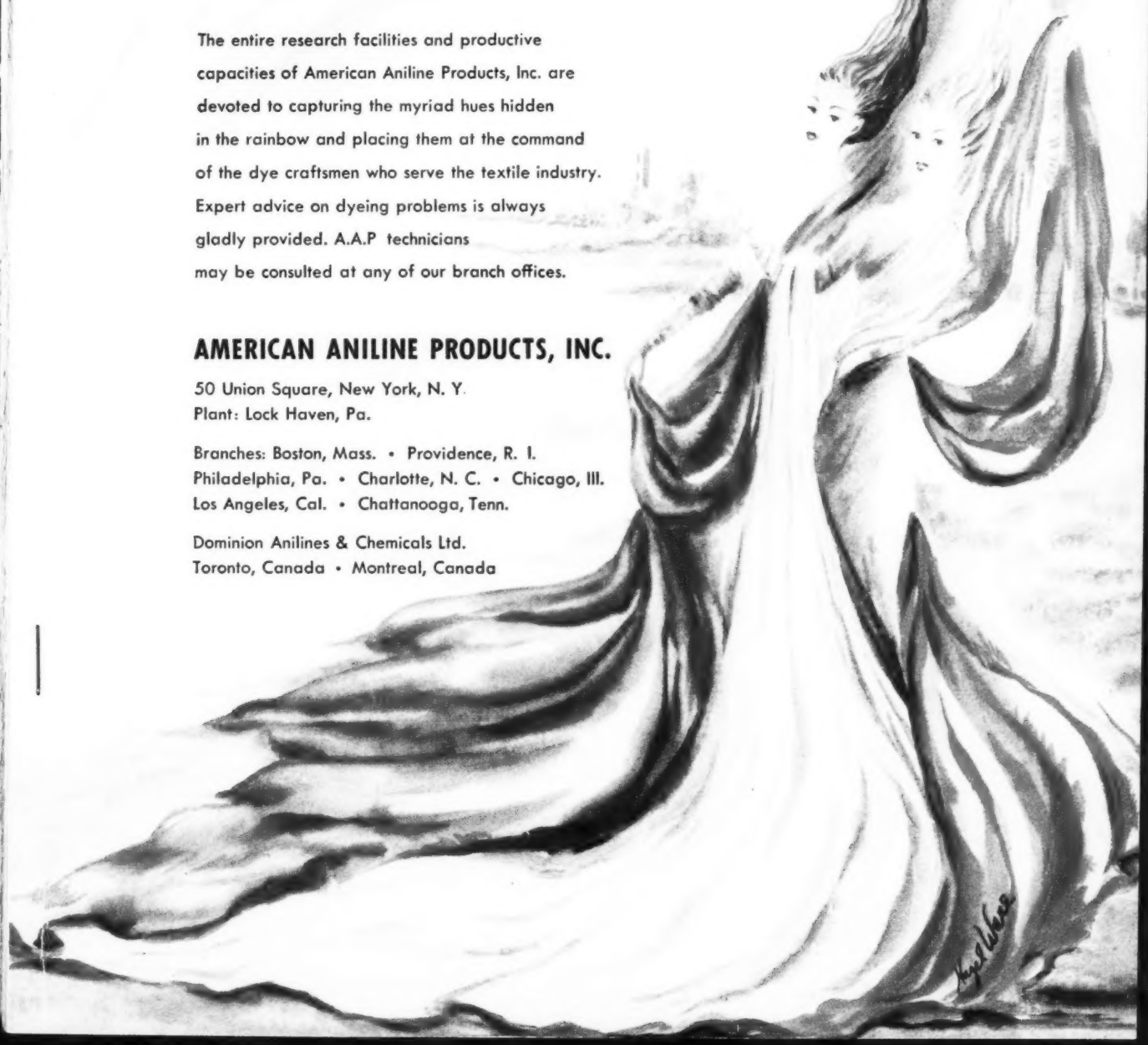
The entire research facilities and productive capacities of American Aniline Products, Inc. are devoted to capturing the myriad hues hidden in the rainbow and placing them at the command of the dye craftsmen who serve the textile industry. Expert advice on dyeing problems is always gladly provided. A.A.P technicians may be consulted at any of our branch offices.

AMERICAN ANILINE PRODUCTS, INC.

50 Union Square, New York, N. Y.
Plant: Lock Haven, Pa.

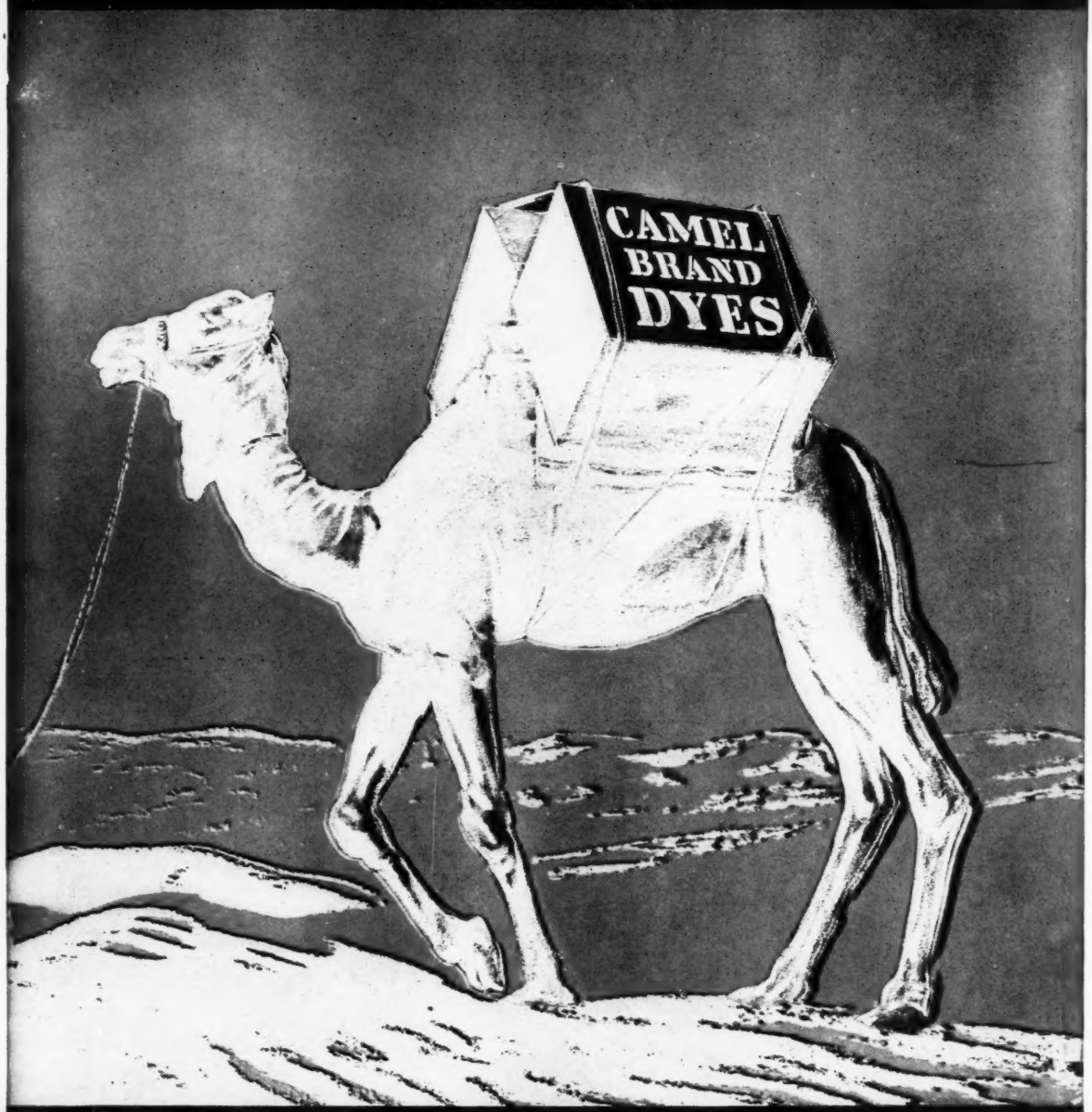
Branches: Boston, Mass. • Providence, R. I.
Philadelphia, Pa. • Charlotte, N. C. • Chicago, Ill.
Los Angeles, Cal. • Chattanooga, Tenn.

Dominion Anilines & Chemicals Ltd.
Toronto, Canada • Montreal, Canada



QUALITY DYESTUFFS

SINCE 1878



JOHN CAMPBELL & COMPANY, INC.

75 HUDSON STREET • NEW YORK CITY

TELEPHONE: BArclay 7-6228-6229

PHILADELPHIA: BROAD AND SPRING GARDEN STS.

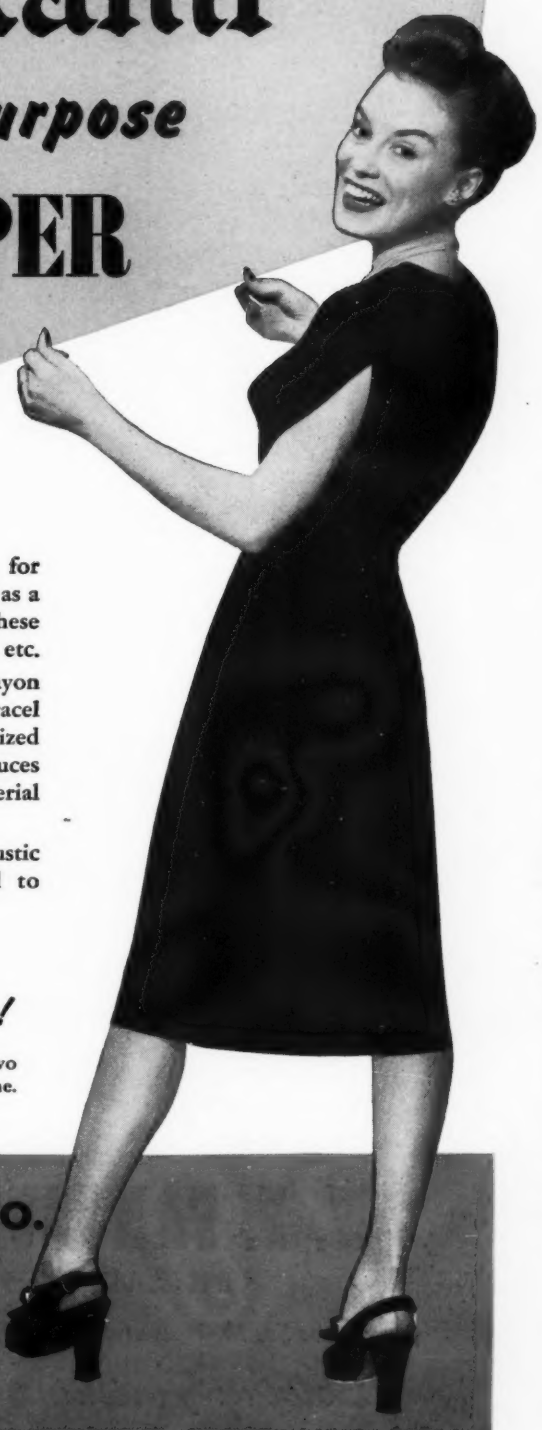
BRANCH OFFICES AND WAREHOUSES:

BOSTON EAST CLEVELAND, OHIO ATLANTA, GA.

Hydroxanil

the Multi-Purpose

DEVELOPER



HYDROXANIL is not only excellent for acetate and nylon blacks but also finds extensive use as a developer for rayon and cotton developed colors. These include Diazo Black BH, Diazo Green 3G, Primuline, etc.

Wash-fast developed blacks on acetate and rayon combination materials may be obtained by using Maracel Developed Black A and Diazo Black BH diazotized and developed with Hydroxanil. This method produces greater wash-fastness than when this type of material is dyed with acetate and direct blacks.

Hydroxanil is simple to use—requires no caustic soda. Simply stir into boiling water and add to developing bath.

...Develops Complete in 30 Minutes!

No excess rinsing or soaping required! Two batches dyed in the time usually required for one.

MARCO PRODUCTS

MAHER COLOR & CHEMICAL CO.

FACTORIES AND LABORATORIES

355 West Ontario Street, Chicago 10, Ill.

2327 East Eighth Street, Los Angeles 21, Calif.

American Dyestuff Reporter, Vol. 36, No. 14, July 14, 1947. Published every other Monday. Copyright, 1947, by Howes Publishing Co., One Madison Ave., New York 10, N. Y. Domestic subscripton, $5.00; Canadian, $6.00; Foreign $6.00. Entered as second-class matter, Nov. 6. 1919, at the New York, N. Y., Post Office, under the act of March 3, 1879.

It's the FINISH that Counts!

At a swimming meet or in today's textile market, the race is won at the *finish.* Hosiery, in fact *all* textile products, to keep in the sales swim, must have a winning appearance.

Whether your finishing problems be nylon, cotton, silk, wool or rayon, you can rely on Fancourt to solve them. A letter or phone call today will help you avoid finishing problems tomorrow.

Hydropel—A concentrated, finely dispersed wax emulsion. Used as wax finish or as two-bath water repellent . . . compatible with anti-mildew compounds.

W. F. FANCOURT & CO.

PHILADELPHIA, PA.

In the South, Howard A. Virkler, Greensboro, N. C.

Solving Finishing Problems Since 1904

Artistry in .. Chemistry

VELVAMINE K-90

An improved softening and finishing agent for use on all types of fabrics. It imparts an odorless finish which is resistant to washing and dry cleaning. Can be used as a substitute for sulphonated oils, tallows and other softeners. Its use eliminates yellowing and rancidity often encountered with the usual fatty type of softening agents.

PERMALENE SOL

A penetrant and cleanser designed for use on all fabrics especially those that are tightly woven and highly twisted. Recommended for pad-dyeing where it insures uniform and thorough penetration. It is of great assistance where low temperature dyeings are necessary. Non-foaming at high speeds, it is stable in neutral, alkaline and acid solutions.

VELVAMINE GF

Velvamine GF is a blend of amines and softeners designed to protect acetate colors from gas or fume fading. It resists removal by drycleaning and, when used on mixed fabrics, has a minimum effect on the shade and light fastness of the direct colors. Velvamine GF produces a soft, full hand and does not affect the appearance of the treated fabrics.

PERMALENE WS

A white powder soluble in water at 80° F. Capable of dispersing iron, calcium and magnesium salts and redissolving or re-dispersing precipitated compounds of these metals. It is so highly buffered that the pH of its solution is practically independent of its concentration.

REFINED PRODUCTS CORPORATION

LYNDHURST • NEW JERSEY

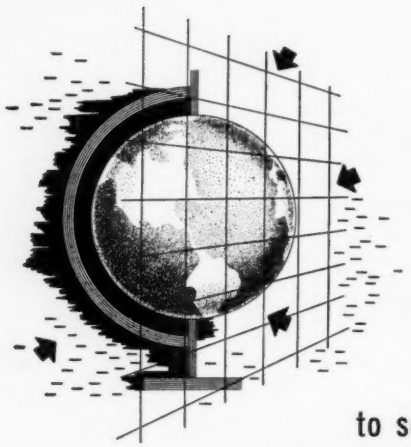
*Manufacturers of PERMA-CIDE, the approved, outstanding, mildew-proofing agent

Southern Representative: DYER S. MOSS, 1301 Liberty Life Bldg., Charlotte, North Carolina

New England Representatives: E. L. LEGG, P. O. Box 597, Providence, R. I. / CLARENCE E. MOSS, 19 Wilson Ave., Rumford (16) R. I.

Canadian Selling Agents: Carbic Color and Chemical Co., Inc., 56 McNab Street South, Hamilton, Ontario

Exporting Agent: Chem-Cal Company, 82 Wall St., New York City.



Spin the Globe...

There's a FALLEK Representative Everywhere!

Here is your opportunity to secure World Wide Distribution for American Dyestuffs ...

READ THESE FIGURES!

92% of the world's total exports in Coal-Tar Colors, Dyes and Stains were supplied by Europe to the rest of the world.*

4.6% of the world's total exports in Coal-Tar Colors, Dyes, and Stains were supplied by the United States to the rest of the world.*

With foreign production at a minimum level, now is the opportune time for American Suppliers to secure a solid foothold in the most lucrative overseas markets . . . and here is how FALLEK can help you:

FALLEK . . . eliminates costly credit risks. *You receive your check when your goods are ready for shipment* . . . as simple as a domestic transaction, but larger profits.

FALLEK . . . creates an acceptance for your products throughout world markets that assures continuous business.

FALLEK . . . gains you the proper entree with leading firms of known responsibility.

FALLEK . . . gives you intelligent, daily sales coverage through representatives located in every world market.

FALLEK . . . means permanence, through long established outlets in Europe, Latin America, and the Orient.

FALLEK . . . saves you the detail handling and numerous expenses of operating an export department.

FALLEK . . . brings you men of wide experience, men highly skilled in the problems of world distribution . . . plus skilled technicians in every foreign office fully equipped to render all the technical information necessary to users of American Dyestuffs.

American dyestuffs for textiles, leather, paper, etc., are in urgent demand throughout the world. You can realize a sizeable share of this business by making FALLEK your foreign selling agents. THIS is the time to safeguard profits against the hazards of "buyer's market" or a falling off in domestic demand, by developing a substantial export volume. FALLEK can do this for you.

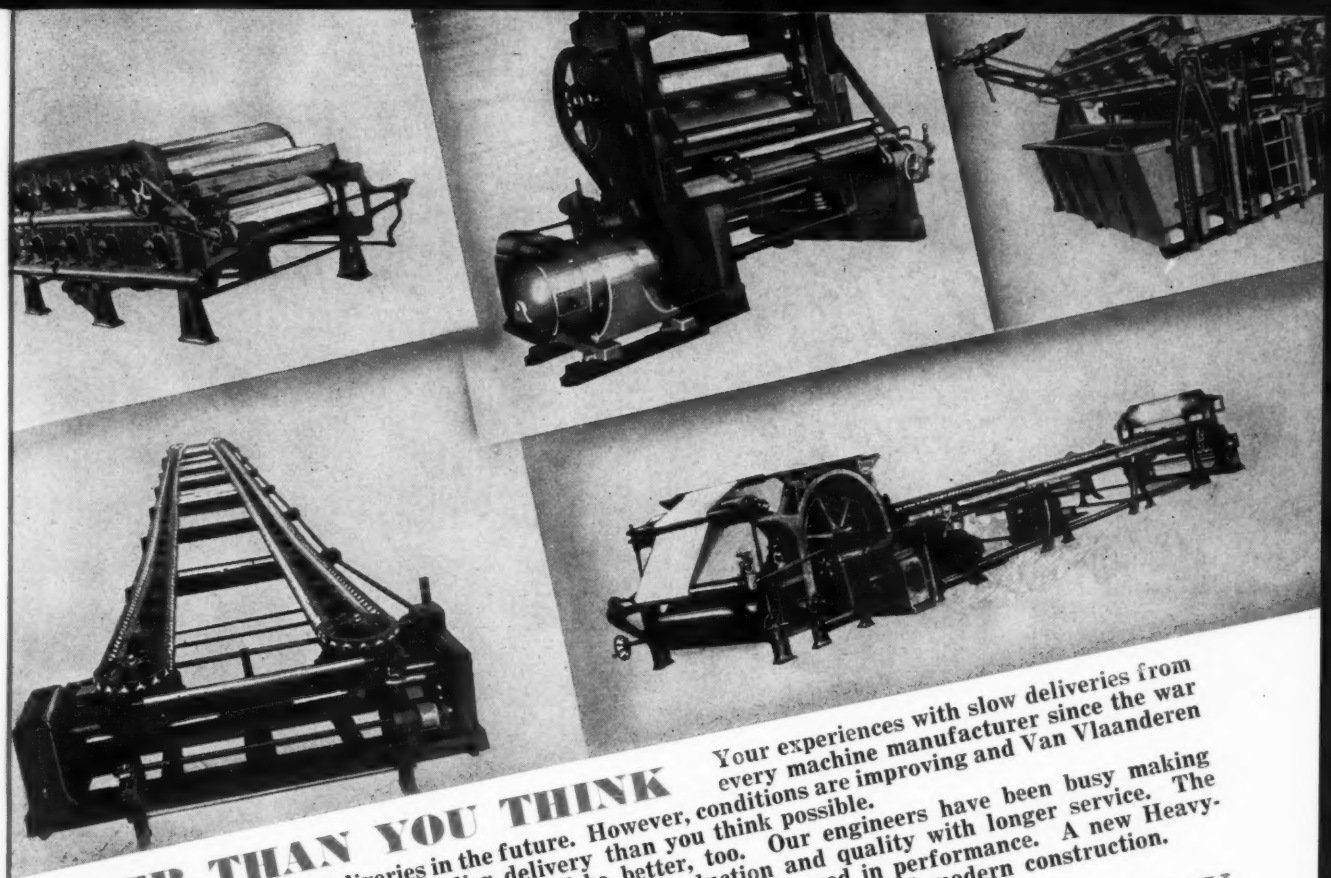
**U. S. Tariff Commission Report No. 19 last pre-war figures*

WRITE, WIRE OR PHONE FOR FURTHER INFORMATION.

FALLEK PRODUCTS COMPANY, INC.

149 BROADWAY • NEW YORK 6, N. Y.

SPECIALISTS IN ORGANIC CHEMICALS



OONER THAN YOU THINK

Your experiences with slow deliveries from every machine manufacturer since the war may cause you to expect slow deliveries in the future. However, conditions are improving and Van Vlaanderen may be able to take your order for earlier delivery than you think possible.

The Van Vlaanderen Equipment you buy now will be better, too. Our engineers have been busy making improvements on many of our machines to give better production and quality with longer service. The Tensionless Jig, the Tuber, the Tenter Clip and others have been improved in performance. A new Heavy-duty Tenter has been added for those who want the last word in capacity and modern construction.

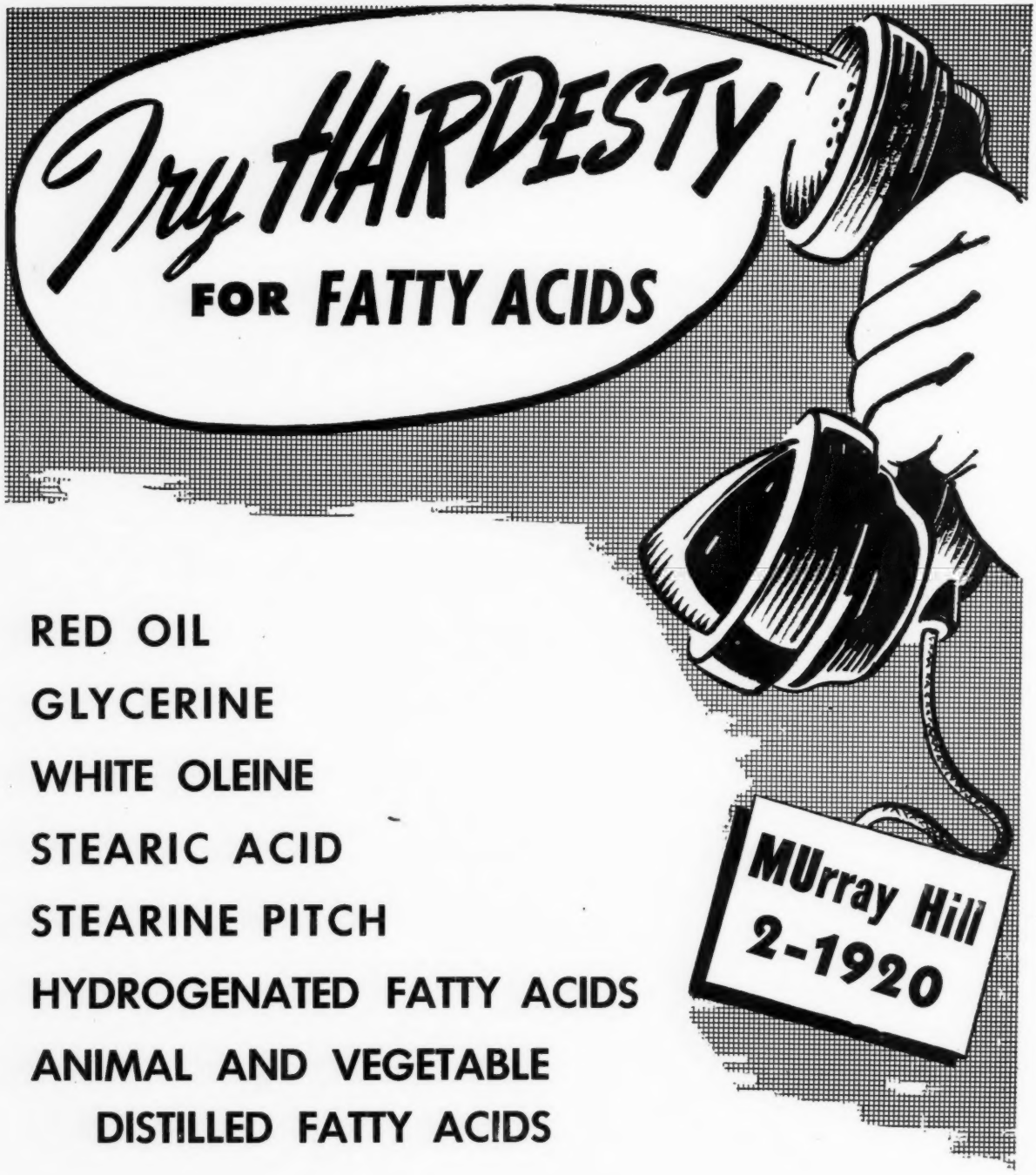
Discuss your machinery requirements with us.

VAN VLAANDEREN MACHINE COMPANY

370 Straight Street, Paterson 3, New Jersey • Cable Address: VLAANDEREN, PATERSONNJ, U. S. A.

World's largest manufacturer of machinery for processing modern fabrics

Try HARDESTY FOR FATTY ACIDS



RED OIL

GLYCERINE

WHITE OLEINE

STEARIC ACID

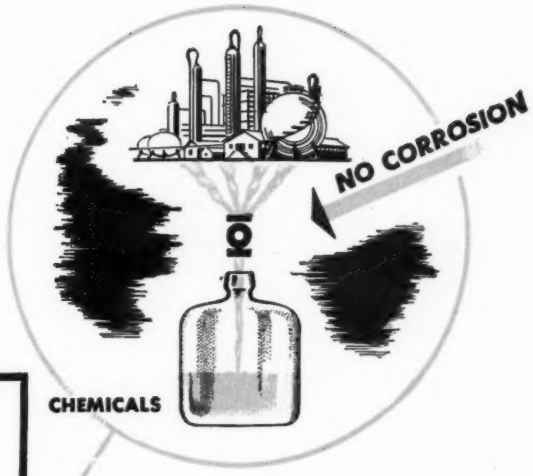
STEARINE PITCH

HYDROGENATED FATTY ACIDS

ANIMAL AND VEGETABLE
DISTILLED FATTY ACIDS

41 East 42nd Street, New York 17, New York. Factories: Dover, Ohio—Los Angeles, Calif.—Toronto, Canada

W·C·
HARDESTY
COMPANY



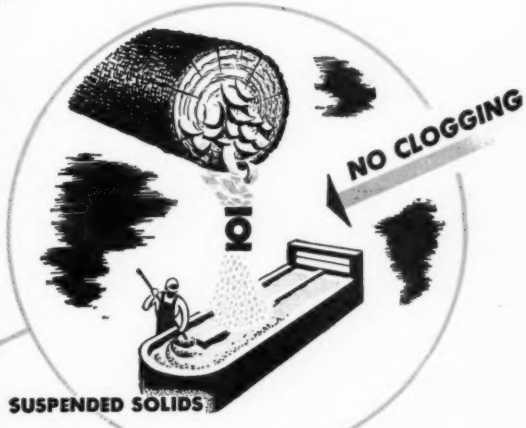
A Valve with . . .

- ★ ISOLATED WORKING PARTS
- ★ CORROSION-PROOF LININGS
- ★ STREAMLINED FLOW

GRINNELL-SAUNDERS DIAPHRAGM VALVES

● The flexible diaphragm isolates the working parts of the valve from the fluid, preventing contamination, and permits streamlined flow plus positive closure even with suspended solids.

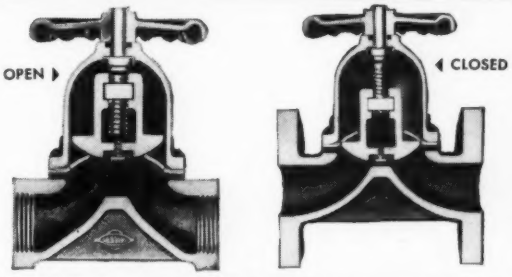
A selection of diaphragm materials and also body linings of glass, porcelain, lead, rubber or synthetics protects against corrosion.



- No packing glands to demand constant attention. Non-rising stem eliminates breakage . . . sealed for protection from dust, weather and corrosion.
- Working parts completely isolated from the fluid. No sticking, corroding or clogging to interfere with easy operation and tight closure. No contamination from valve lubricants.
- Compressor and finger plate combine to support the diaphragm in all positions.
- The large area of contact of the diaphragm on the seat, plus the resilience of the diaphragm, permits positive closure even when foreign matter is trapped.
- No metal-to-metal seats to become damaged or wire-drawn.
- No refacing or reseating is required.
- Streamlined passage without pockets reduces friction to a minimum and prevents accumulation of sludge and foreign solids.
- The valve body—the only metal that could contact the fluid—can be completely lined with glass, porcelain, lead, rubber or synthetic compounds (flange type only) to suit service requirements.

Write for catalog describing Grinnell-Saunders Diaphragm Valves—standard and special types.

GRINNELL COMPANY, INC.
Providence 1, R. I., U.S.A.
Branch Offices in Principal Cities



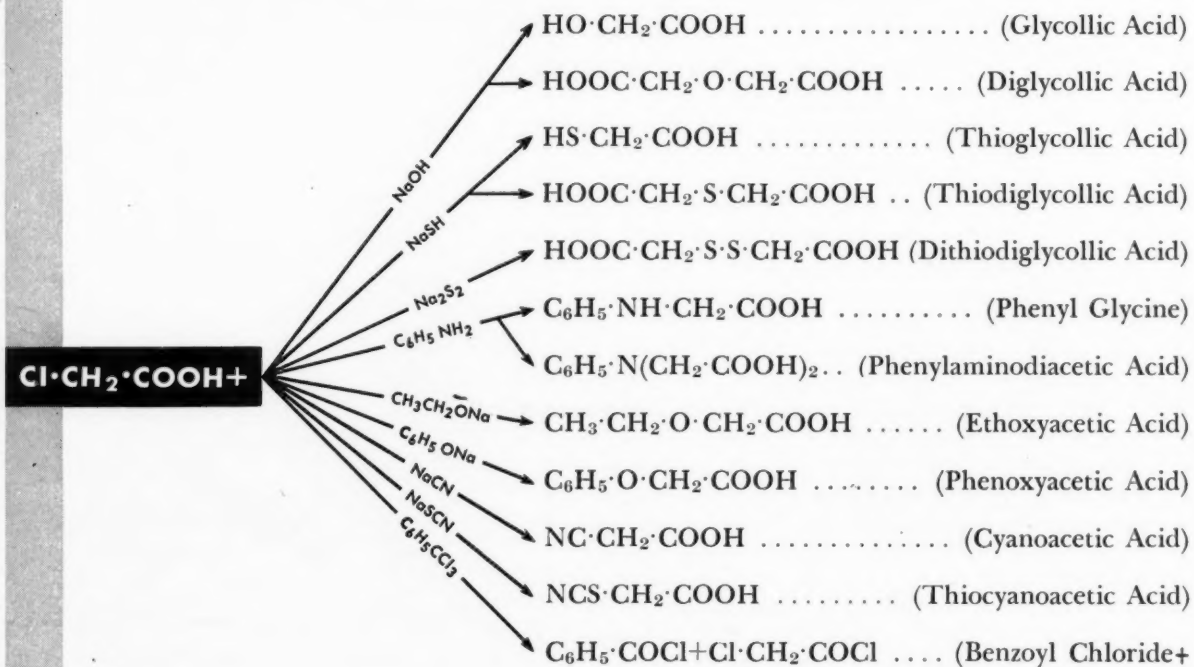
GRINNELL
FOUNDED 1850
WHENEVER PIPING IS INVOLVED

MONOCHLORACETIC ACID

NOW *manufactured by* HOOKER

Hooker is now in production of Monochloracetic Acid. This important and versatile industrial chemical is being produced as both technical and high grade material.

SOME TYPICAL REACTIONS OF MONOCHLORACETIC ACID



➡ Write on your business letterhead for Hooker Technical Data Sheet No. 752 which gives typical data and specifications for both grades of Hooker Monochloracetic Acid.

HOOKER ELECTROCHEMICAL COMPANY

2 Forty-Seventh St., Niagara Falls, N. Y.
New York, N. Y. Wilmington, Calif. Tacoma, Wash.

HOOKER CHEMICALS

Caustic Soda Muriatic Acid Sodium Sulfide Paradichlorbenzene Chlorine Sodium Sulfhydrate

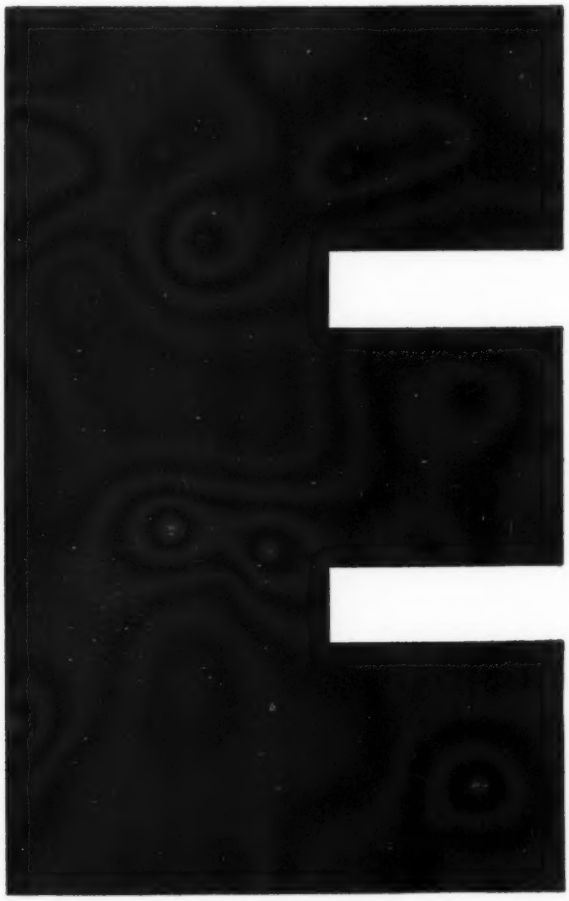
EASTMAN BLUE BNN

A Dyestuff for Cellulose Acetate Rayon and Nylon

EASTMAN BLUE BNN is a highly dispersed anthraquinone dyestuff which produces neutral shades of blue on cellulose acetate and a somewhat greener shade on nylon. In medium to dark shades, it has very good fastness to light and washing, and is superior in this respect to most anthraquinone blues.

Blue BNN has good solubility, and is recommended for use as a self shade or in combination with other dyes for producing any mode shade requiring a blue component. Unusual build-up and level-dyeing characteristics at either high or low temperatures make possible a saving in dyestuff consumption. Both box and jig may be used.

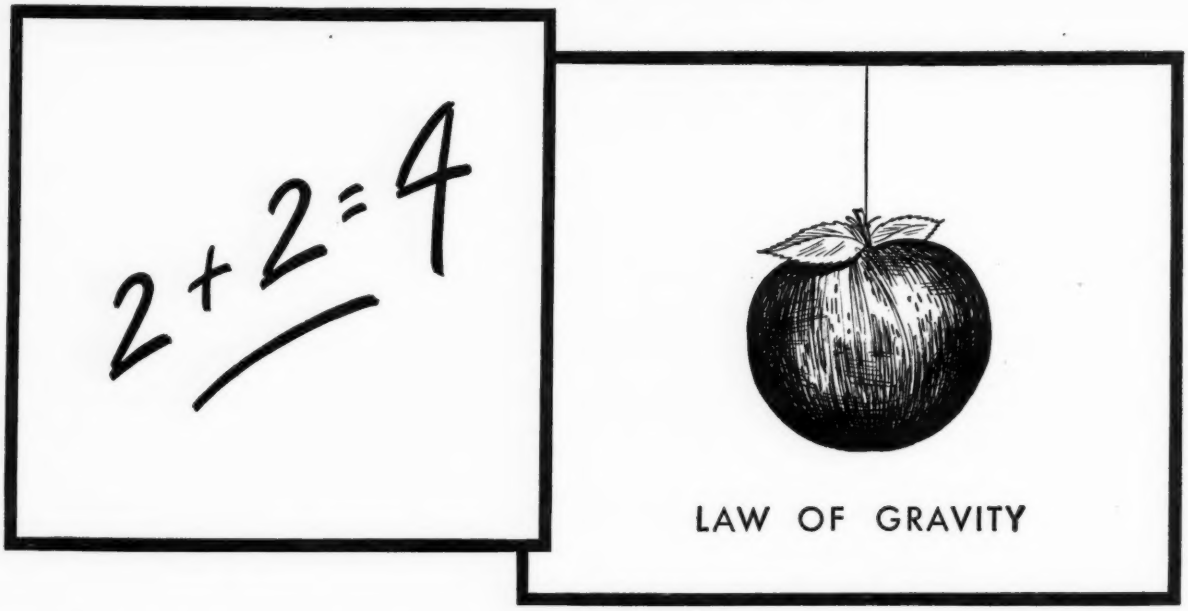
Eastman Acetate Dyestuffs are available in a wide variety of useful colors for the dyeing of acetate rayon. For further information about these dyestuffs, write to TENNESSEE EASTMAN CORPORATION (Subsidiary of Eastman Kodak Company), KINGSPORT, TENNESSEE.



Eastman

ACETATE DYESTUFFS

TWO SAFE BETS • •



FOR SCOURING AND DYEING WOOL YARNS

SOAPS or synthetic detergents — which gets the call for scouring and dyeing woolen and worsted Yarns?

Either Olate or Orvus will give you the efficient performance so essential in the scouring operation. In dyeing, it's Orvus all the way. Olate-scoured and Orvus-dyed yarn . . . or yarn scoured and dyed with Orvus alone . . . comes out soft, lofty, resilient, clean to the core. Here are their special characteristics—judge for yourself.

Olate

A pure, neutral flaked soap of exceptionally low titer and gentle cleansing action. • Fast dissolving. • Fluid solutions penetrate fibers quickly and thoroughly. • Excellent emulsifying properties. Holds spinning oils and dirt firmly in suspension until flushed away in rinse.

ORVUS *

A time-tested, neutral synthetic detergent. • Assures efficient removal of spinning oils. • Tends to reduce felting of yarn. • Effective in acid bath. • No hard water precipitates. • Softens and lubricates the fibers. Leaves yarn in excellent condition for subsequent operations. • Maximum safety.

* Talk over your Orvus needs with your Procter & Gamble salesman.

Procter & Gamble

Colors to PLAY with...

CALCOSOL* and CALCOLOID*

Vat Dyes

Many of the gay, color-bright play clothes and bathing suits seen at resorts this summer owe their beauty and fastness properties to CALCOSOL and CALCOLOID vat dyes.

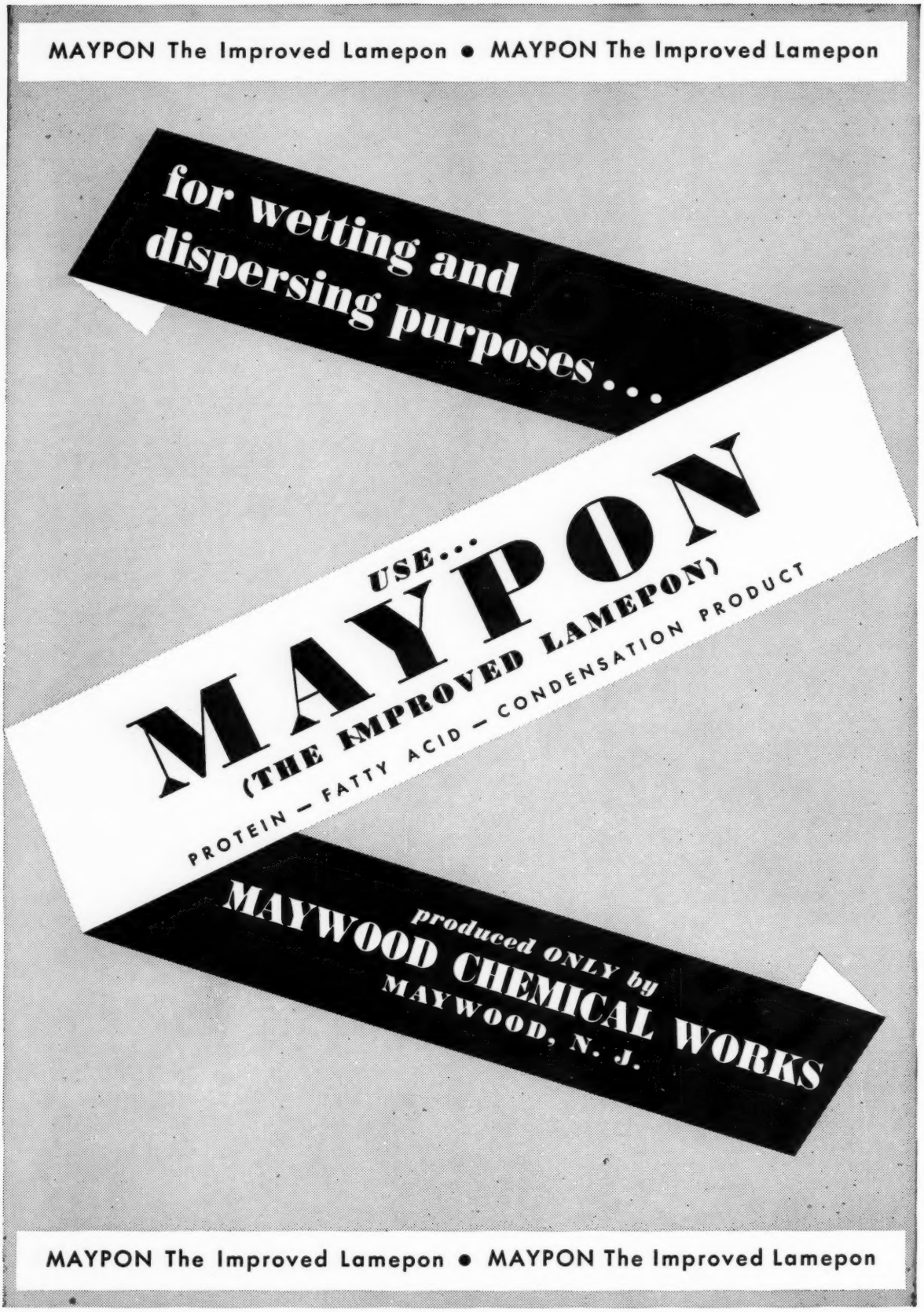
These two groups embrace a wide range of colors for cottons, linens, rayons and mixtures—with extraordinary fastness to sunlight, salt water, perspiration, chlorine and exposure to weather.

Consult your Calco representative on the most effective methods of applying these modern, improved vat dyes. CALCO CHEMICAL DIVISION, AMERICAN CYANAMID COMPANY, Bound Brook, New Jersey. New York, Chicago, Philadelphia, Boston, Charlotte, Providence.

*Trademark

Reprints of this advertisement suitable for framing and without text will be sent on request.

Calco


MAYPON The Improved Lamepon • MAYPON The Improved Lamepon
for wetting and dispersing purposes . . .
USE . . .
MAYPON
(THE IMPROVED LAMEPON)
PROTEIN — FATTY ACID — CONDENSATION PRODUCT
produced ONLY by
MAYWOOD CHEMICAL WORKS
MAYWOOD, N. J.
MAYPON The Improved Lamepon • MAYPON The Improved Lamepon

S/V FINISHING OILS A and B improve wide range of Finishing Operations—Aid in Mechanical Pre-Shrinking

S/V Finishing Oils A & B offer a unique combination of selected ingredients that assure outstanding results in a wide range of finishing operations.

For plain softening, for instance, they form highly dispersed emulsions that penetrate rapidly into the fibers, giving uniform softness to such cloths as shirtings, draperies, percales, corduroys, velvets and velours. Where a particularly soft hand is required, S/V Finishing Oil B is recommended.

For starching operations, S/V Finishing Oils are compatible with virtually all starch mixes, thoroughly plasticize starch, gums and other materials. They prevent brittleness and minimize cracking or chafing-out even in heavy back filling applications.

Their excellent wetting and re-wetting qualities make them particularly valuable in both starched and unstarched materials which are to be mechanically pre-shrunk to definite standards.

★ ★ ★

Get recommendations from your Socony-Vacuum Representative.

SOCONY-VACUUM OIL CO., INC., 26 B'way, New York 4, N. Y., and Affiliates: Magnolia Petroleum Co., General Petroleum Corp.

Better Processing for ALL Textiles

Woolens . . . S/V Woolrex Oils improve carding and spinning. Scour out easily.

Worsteds . . . S/V Worstex Oils lubricate stock uniformly. Improve spinning.

Water Repellents . . . S/V Products give maximum repellency with minimum amounts.

Finishing . . . S/V Finishing Oils give excellent wetting, re-wetting and softening effects.

Shrinkage Process . . . S/V Finishing Oils insure quick, uniform re-wetting.

Rayon Processing . . . S/V Rayon Oils add softness to rayon fibers.

Process Products
SOCONY-VACUUM

Socony-Vacuum Process Products

Lanascour

DREW'S NEW WOOL SCOURING AGENT

Combines the well-known advantages of soap with the most desirable qualities of synthetic detergents.

LANASCOUR was developed on specific suggestion from leading wool processors

FOR GREASE WOOL SCOURING
YARN SCOURING
BACK WASHING TOP
PIECE GOODS WASHING

A perfectly balanced compound

Mill Demonstrations Solicited

E. F. DREW & CO., INC.

15 EAST 26th STREET • NEW YORK 10, N. Y.

• FACTORY & LABORATORIES: BOONTON, N. J. •

CANADA	BOSTON	GREENVILLE, S.C.	CHICAGO	BRAZIL
E. F. Drew & Co., Ltd. Montreal	Chamber of Commerce Bldg., Zone 10	805 Woodside Bldg., (New Southern Office)	919 N. Michigan Ave., Zone 11	E. F. Drew & Cia., Ltd. Rio De Janeiro

MORE Ethyleneamines NOW!

The production of ethyleneamines has been increased from drum to tank car quantities in a large new plant unit at Texas City, Texas.

The ethyleneamines are important as organic alkalies and as intermediates for many industrial compounds. With these materials, the way has been opened to product improvement and lower cost processes, in the fields of textile, pharmaceutical, resin, and petroleum chemicals.

CARBIDE and CARBON CHEMICALS CORPORATION

Unit of Union Carbide and Carbon Corporation

30 East 42nd Street UCC New York 17, N. Y.

Offices in Principal Cities

In Canada:

Carbide and Carbon Chemicals, Limited, Toronto

Aminoethylethanolamine . . . for finishing compounds to give fabrics a softer "hand".

Ethylenediamine . . . solvent for sulphur colors for dyeing cotton cloth.

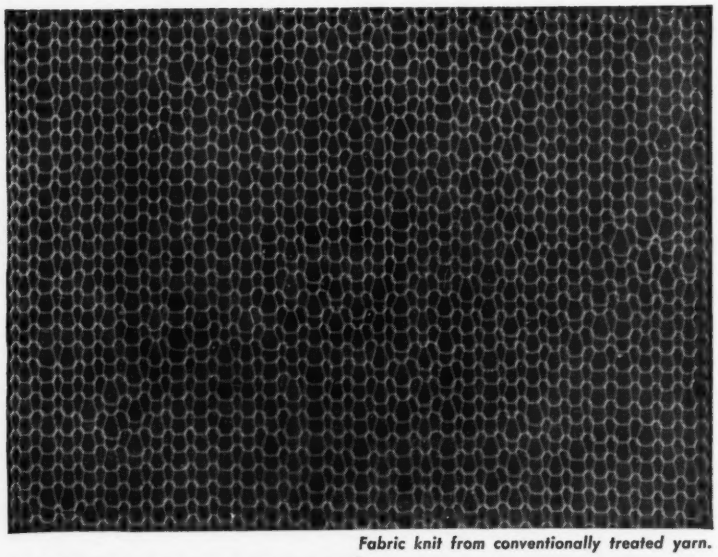
Diethylenetriamine . . . for fatty acid derivatives added to rayon spinning baths.

Triethylenetetramine . . . for ion-exchange resins in water purification.

Tetraethylenepentamine . . . as a rosin soap stabilizer.

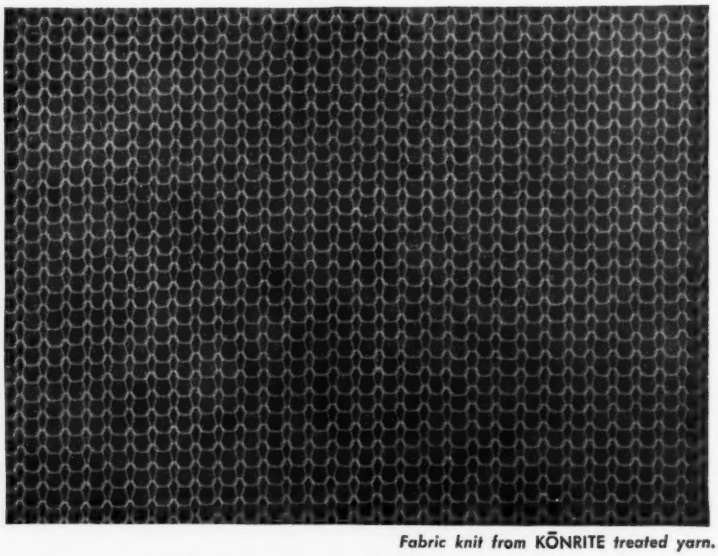
Additional information to determine which of the ethyleneamines can best serve your needs is contained in our "Nitrogen Compounds" booklet (F-4770). In writing for your copy, please address Department A-7.

Is your stitch like this



Fabric knit from conventionally treated yarn.

or like this



Fabric knit from KŌNRITE *treated yarn.*

For the treatment of yarns for truly fine hosiery, Nopco presents KŌNRITE, a new and unique nylon coning oil. In Coning, Knitting, Seaming, KŌNRITE offers you:

OUTSTANDING RESULTS...

...*in Coning*—produces cones of proper density, practically eliminating overlaps, crossovers and underwinds

...increases cone production

...*in Knitting*—minimizes stripping of size—reduces pressoffs

...gives clear perfect stitch formation

...*in Seaming*—reduces roll...its strong defense against curling is a major factor in greatly increased hosiery production

OUTSTANDING ADVANTAGES...

...Controlled viscosity, assuring even distribution of oil on yarn

...New stitches firmly cemented through rapid drying action

...Prevention of softening in lagged yarn and fabric

For full information on KŌNRITE, *please write today.*

NOPCO CHEMICAL COMPANY, Harrison, N. J.

Formerly National Oil Products Company

BRANCHES: BOSTON • CHICAGO • CEDARTOWN, GA. • RICHMOND, CALIF.

EVOLVED THROUGH RESEARCH NOPCO

Kōnrite The Outstanding Nylon Coning Oil

Orange—L'atelier d'impression, par Rossetti, 1764, tapisserie peinte sur toile.
Courtesy Columbia University Library

Manufacture of the printed fabric or *toile imprimee* was depicted on a series of panels by Joseph Gabriel-Marie Rossetti, designer at Orange, France, in 1764. The tapestry above shows proprietors and workers in the print shop.

Cloth was stretched on a table and a "block", or wood engraving covered with color, applied to it. When a number of shades were desired, additional colors were painted on with fine brushes.

By 1782, the copper-plate printing press was introduced, permitting designs of greater variety and perfection.

In the modern process of printing, as in those of dyeing and finishing, rapid and dependable de-sizing is accomplished with

RAPIDASE

WALLERSTEIN COMPANY, INC. **180 Madison Ave., New York 16, N. Y.**

NYANZA

ANILINE & ALIZARINE COLORS

•

TEXTILE CHEMICALS

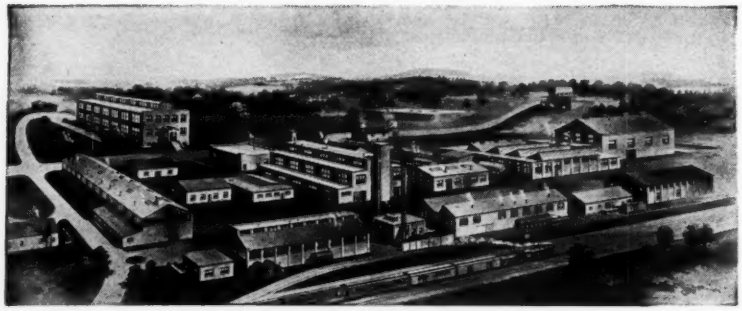
•

FINISHING MATERIALS

FOR

WOOL — COTTON — RAYON — ACETATE

AND MIXED FIBERS



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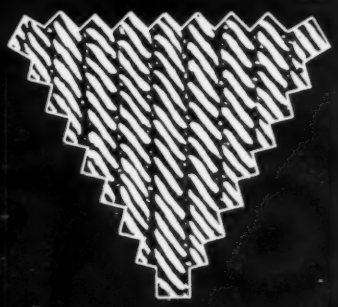

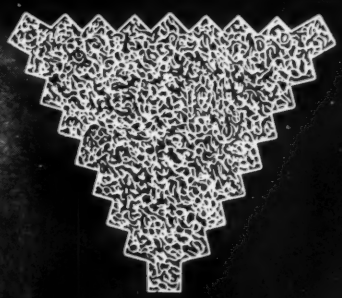

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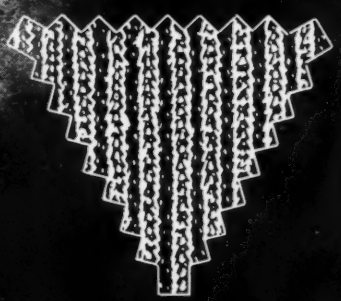

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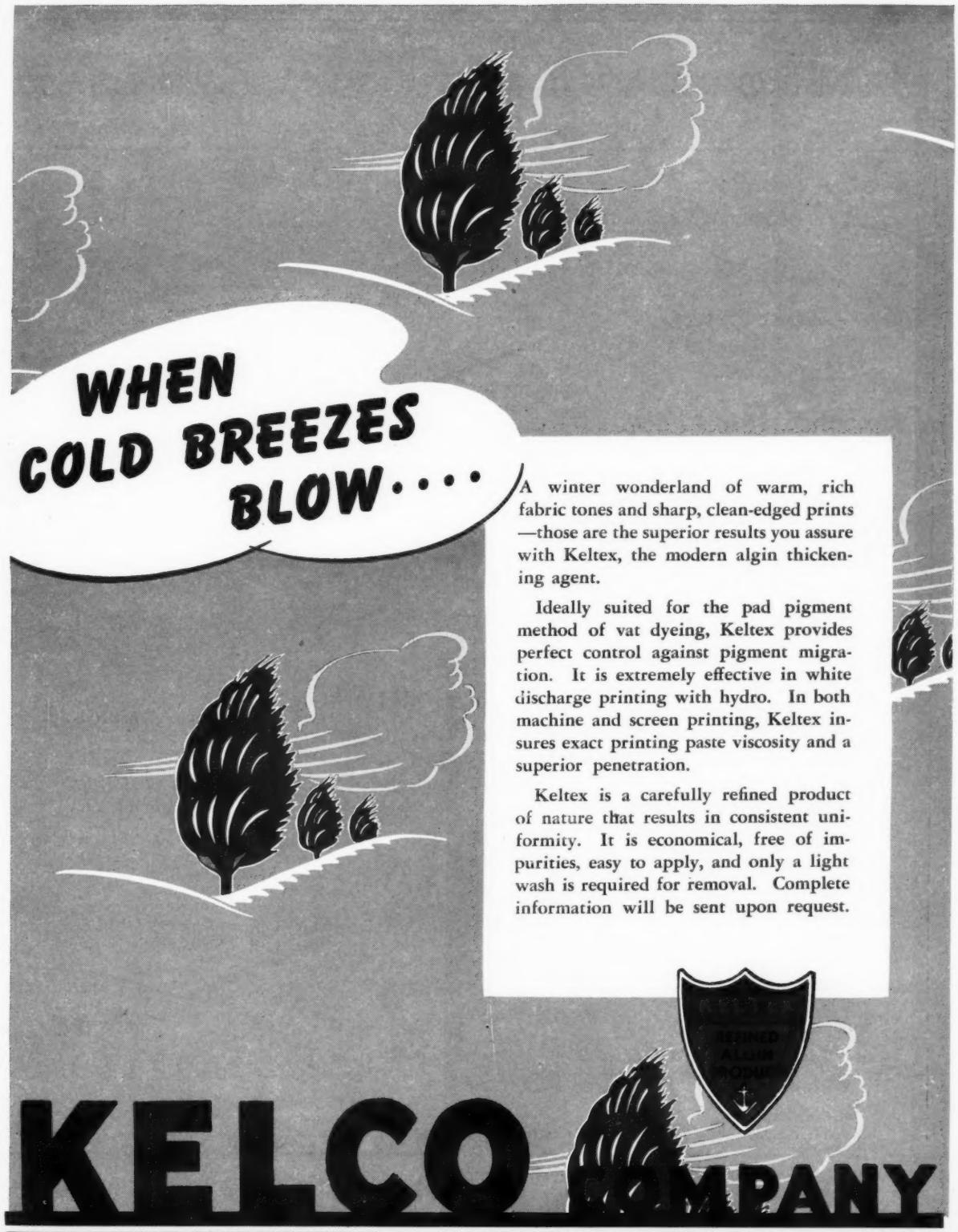
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July 14, 1947

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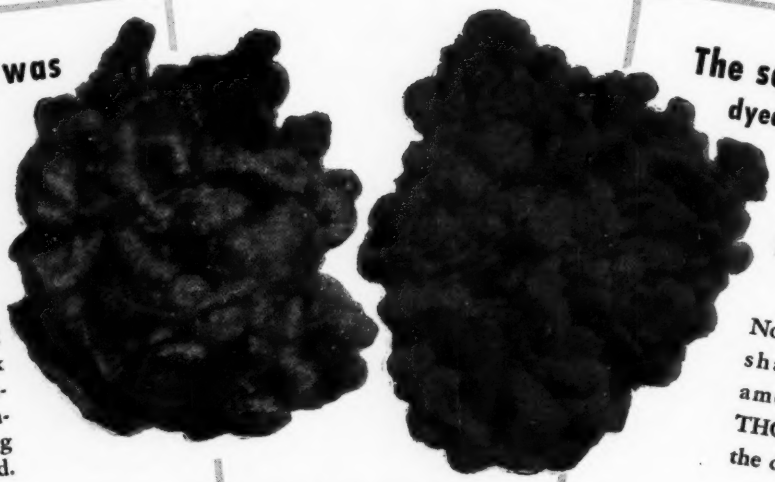
TIPPY WOOL ?

This wool was dyed in the ordinary way

An ACID BLUE (Color Index No. 208) considered an uneven dyeing color, was used.



The same wool— dyed with the same color, but with the aid of ANTHOMINE

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July 14, 1947

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Members should notify the Secretary immediately of all address changes

Rules for the
Intersectional Contest

THE National Intersectional Contest Committee has announced the following rules to be used as a guide by the various sectional committees.

Subject

Almost any subject may be taken that has originality and practical or scientific value with the single exception that a Section should not use as the body of its paper, work done by some sub-committee of the Research Committee of the AATCC. However, this is not intended to prevent a Section from extending or expanding some phase of a general research project. It is merely to prevent any one Section from benefitting from the funds and work done by the Association. The choice of subject will naturally be governed by the system of rating on which the paper is finally judged. This system of rating is given later.

It is important that the subject be chosen early because the time is always found too short to do the subject justice and, in addition, there may be occasional conflicts in which two Sections may choose the same subject. In such a case, the matter is brought to the attention of both Sections so that they may continue on the same subject or not as they prefer.

The title of the paper should not be released for publicity until approved by the National Intersectional Contest Chairman. All news releases must be handled through the National Chairman of Publicity.

Speaker

Any member of the Association may be the speaker. He need not necessarily be a member of the Section for which he is speaking.

Judge

Any member of the Association may be the judge representing a Section. It is felt, however, that the judge should be, if possible, a member of the Section which he represents in order that each Section may be fairly and equally represented in the final judging.

The judge chosen by the Section is free to call upon anyone for expert advice as it is unusual for any one man to be competent in all the fields covered by the different papers. The actual rating of the paper, however, is his privilege alone, and a rating sheet will be supplied by the "Chief Justice." Each Section is entitled to be represented by one judge. The "Chief Justice" is appointed by the National Intersectional Contest Chairman.

Selection of the Prize Winners

The papers of each Section are weighed by the judges on the following basis:

For originality	30 points max.
For scientific value	30 points max.
For practical value	30 points max.
For presentation	10 points max.
TOTAL	100 points

Each judge will rate each paper independently on this basis and the paper getting the highest total number of points will win the contest. It is obvious that considerable emphasis is put on originality and that the paper must present something new and novel, something that has not been published before. The subject may be one of practical money value to a mill or to consumers, or it may be of scientific or fundamental value which perhaps has little direct economic interest. Some members have felt that no value should be given to the presentation, but the majority feel that the speaker and exhibits, slides, or whatever may be used to make the subject clearer and more interesting, should rate a maximum of 10 points.

The judges must submit a report of their voting to the "Chief Justice" just before the presentation of the Contest Papers. At the close of the Contest the judges then must submit their votes for presentation value.

Details of the Paper

The paper is not restricted as to length but its actual presentation will be limited to 20 minutes. This means that a condensed version of the paper, emphasizing its high points, will be given at the meeting while the paper itself will be published in full in the Proceedings in the AMERICAN DYESTUFF REPORTER. Please note that the paper is the property of the Association and is not to be released to any other publication.

Twelve copies of the paper must be furnished to the National Intersectional Contest Chairman at least a month before the Contest. These copies will then be immediately distributed to the judges and the National Publicity Chairman. The judges need a full month to read, review and rate the papers.

The papers should be typewritten, double spaced, using only one side of the sheet and leaving ample margins. One of the copies should be accompanied by the original drawings, in black ink, and glossy photographs. This copy will be used for publication.

Exhibits

Any requests for exhibits or display features at the Contest should be made known at the time of submitting the copies of the paper to the National Intersectional Contest Chairman.

Technical Program

Chicago Convention — October 23, 24, 25, 1947

Theme: "Blazing Trails to Better Textiles"

General Meeting, Friday morning, October 24th 9:30 A.M.-12:00 Noon

Technical papers of general interest will be presented by invited speakers. The subjects will be of considerable importance to all members concerned with textile mill operations, research and development.

Group Meetings, Friday afternoon, October 24th 2:00 P.M.-5:00 P.M.

Six group meetings will be held simultaneously, dividing the membership as far as possible according to their specific interests. The groups will be designated as follows:

Cellulosic Fibers
Non-Cellulosic Fibers
Hosiery
Finishing and Auxiliaries
Testing
Fundamental Research

A chairman is being selected for each group, who will conduct the meeting and lead the discussion periods. Each session will include one or more papers by invitation on subjects of general interest to the group. In addition, an invitation is extended to all AATCC members and others engaged in technical activities in the above group classifications to contribute papers. Instructions for contributed papers are given below.

The titles of the group meetings are largely self-explanatory, but the following additional information will be of interest:

Cellulosic Fibers

The problems of cotton, rayon and acetate processing, and of products containing mixtures of these fibers, is to be covered. Papers are desired on new and modified procedures involving preparation, dyeing, and other aspects of the production of these materials. There is a specific interest in papers on new or improved machinery, as well as control instruments and instrumentation. Exhibition of models of new machines and instruments also is solicited.

Non-Cellulosic Fibers

This group will be concerned with wool and other protein fibers, nylon and other non-cellulosic synthetics, and all blends of these fibers. The interests are parallel with those listed under the Cellulosic Fibers group.

Hosiery

Chicago is an important center of the hosiery industry, and it is expected that there will be an unusual attendance from the South-Central Section, also a hosiery center. This group meeting will be open to all problems involved in the hosiery industry.

Finishing and Auxiliaries

Any and all aspects of this broad field are open for consideration at this meeting. There is a strongly expressed interest in the various new finishing processes and new chemical auxiliaries introduced in the post-war period.

Testing

A major function of the AATCC is the establishment of test methods, either through development under the AATCC research program or acceptance of methods submitted to the association. Papers will be welcome on new or modified test procedures and equipment, as well as evaluation of existing methods. The extension of test methods into end use evaluation is to be stressed in the future AATCC research program, and papers on any phase of this subject will be especially welcome.

Fundamental Research

The growing interest in fundamental research of many kinds relating to textile processing, and especially dyeing and finishing, suggests the desirability of a group for discussion of work in this field. Papers on original work and also reviews of the work of others and progress in fundamental studies are desired.

Contributed Papers

The following instructions and regulations are to be followed for contributed papers:

(1) Every one desiring to contribute a paper should advise Dr. M. A. Dahlen, Room 8518 Nemours Building, Wilmington, Delaware, *immediately*, giving the title of the proposed paper and the group in which it is to be presented. A statement should be made also as to whether fifteen, thirty or forty-five minutes is desired for presentation of the paper.

(2) As soon as the number of papers available for each group is known, a selection will be made for each group and the contributors will be advised as to whether their papers have been accepted. It is necessary to make this selection in the near future in order to present a well-balanced program.

(3) An abstract outlining the scope and nature of the paper will be required well in advance of the Convention, the date to be set later.

(4) The paper, as presented orally, may be an abridged version of the written paper.

(5) All papers in complete form ready for submission to the "American Dyestuff Reporter" for publication must be available at the time of the Convention. Earlier submission is desirable.

(6) Papers must not be primarily of an advertising or promotional character. However, the subject matter may present commercial products, machinery, instruments, processing procedures, etc., of a commercial nature provided they are treated from a technical standpoint.

(7) The Technical Program Committee must be the judge as to which papers are to be accepted, but an effort will be made to include all contributions considered suitable.

Suggested Papers

Many members may have ideas as to desirable topics for papers to be presented at the group meetings. All suggestions as to the subject of such papers, and also suggestions as to authors, will be welcome. These, too, should be sent promptly to Dr. M. A. Dahlen.

This is Your Meeting — Participate by Offering a Paper!

Executive Committee on Research Sponsors Special Meeting on Future of AATCC Research

A special meeting of the Executive Committee on Research was held on June 5th in New York to discuss the future research program for the AATCC. In order to obtain a cross-section view of the entire industry, a number of persons, representing dyestuff and chemical manufacturers, mill chemists, textile processors, consultants and educators, were invited to attend the meeting.

In opening the meeting, Chairman J. Robert Bonnar stated that the future work would depend upon what was wanted by the members, their employers and what outside organizations would expect of us. He pointed out that (1) we could go into fundamental research or leave this to other organizations, (2) we could cooperate with other organizations, doing that part of the work best siuted to our objectives, (3) we could continue work on our test methods, or (4) we could go into further work on application research.

A number of interesting thoughts and arguments in favor of, or against, certain phases of research work were brought out in the ensuing discussion.

One thought presented was that we use the tools of fundamental research set up by other organizations and apply them to practical research problems. It was stated by another speaker that he also did not favor the AATCC engaging in fundamental research because the cost of such work is prohibitive and it might be years before any constructive results were obtained. He was of the opinion that corporate members look to us for quick answers on a practical basis and scale. It was also suggested that there had been much fundamental research work done which could be turned over to qualified members of the AATCC for conversion into language which the practical man could understand. A number of persons were of the opinion that the AATCC should follow a course between fundamental and practical research.

It was pointed out that the various terms applied to research were used rather loosely and without proper definition and that regardless of what it was called (academic, fundamental, applied, or otherwise) it should be done with a practical end in view.

The suggestion was made that we might sponsor work in several universities covering three to five years on some basic problems. A similar plan to this called for the AATCC to promote fellowships for degrees above the four-year bachelor degree as this would tend to elevate the entire industry by training men and solving problems not heretofore investigated.

As regards work on test methods it was stated by one speaker that there could be no end to the task of setting up standard test methods as they must always be maintained and changed to meet variations in trade demands and in new fibers, processes, methods, etc. It was brought out by a number of persons that the work on test methods would not be complete until they had been carried further and correlated with consumer end use.

The idea of a pilot plant was discussed in considerable detail. One speaker stated that there are many problems that industries do not see fit to tackle which could be done in a pilot plant, and the experience of our members in conjunction with a pilot plant would yield some remarkable results. Another speaker suggested that the best course for the AATCC to follow would be to continue along present lines, carrying the test methods to consumer end use, and utilizing a pilot plant for practical research. It was stated that the pilot plant was the next logical step to find out how to do things on a practical basis to eliminate or improve present methods where quality was not satisfactory for consumer use.

Other speakers were opposed to the idea of a pilot plant on the basis that it would be too expensive to operate and that at present the members represented enough equipment which could be placed at the disposal of the Association with practically no expense. It was also pointed out that there was much ideal machinery in the colleges which could be utilized as a pilot plant. Another speaker stated that even with a well-equipped pilot plant the problem of suitable personnel to operate it would not be easy of solution. It was suggested that a committee be organized to study the pilot plant idea even though it might take one or two years to make a thorough investigation.

Other suggestions made during the meeting included: disseminating needed information not only to the consumer but also the retailer and clothing manufacturer; a source of research projects of primary interest to the members might be found in the subjects chosen by the various section for presentation in the Intersectional Contest.

The results of the discussion are tabulated as follows:

Fundamental Research	
For	3
Against	11
Later	0
Pilot Plant	
For	4
Against	3
Later	2
Continuation of Test Methods	
For	10
Against	0
Extension of Test Methods to End Use	
For	10
Against	0
Application Research	
For	11
Against	0
Sponsor Fellowships	
For	5
Librarian to Convert Files on Fundamental Research	
For	2
Better Articles on Scientific Basis for Proceedings	
For	3
Publicity	
For	3
Committees Suggested	
Study Pilot Plant	2
Look into problems not answered in industry	2
Studying Fading Lamp	1

Note: The figures above do not represent votes taken on the subjects, but outlines the statements made by the thirty-two persons present.

Conclusions drawn from the meeting would indicate that the consensus of opinion was:

(1) Present standard test methods should be kept current both with the times and development of new fibers, and furthermore should be continued further to include correlation with end use.

(2) AATCC should not go into pure or fundamental research when on too high a level, but should go into certain projects on an application research level.

(3) It would be impossible to set up a pilot plant at the present time and use should be made of available facilities in plants and education institution.

Questionnaire on Research

UNDER the auspices of the Executive Committee on Research, questionnaires on research are now being mailed to all members of the Association.

The E.C.R. points out in an accompanying letter that in recent years the Association has expanded considerably the functions of the General Research Committee. This accelerated activity was made possible by the larger number of of members who are contributing their services and ideas, as well as the increased salaried staff of research personnel.

Since there is a natural reluctance on the part of most members to offer their services or to make suggestions to established committees, and since there is no recognized method for making such contacts, the questionnaire was prepared.

The letter continues:

"This questionnaire has purposely been made all-inclusive in considerable detail as only by knowing the information requested and tabulating it can the purpose for which it is intended be served. This purpose is to produce for your administrative officers factual data as to the studies and problems the individual members desire the AATCC to undertake, with proper resulting benefit to not only the members but their respective employers. The answering of this questionnaire in a serious and careful manner will then permit the proper choice of individuals for functioning committees, taking into account willingness, facilities and knowledge. Hence the investigation, evaluation of results, and dissemination of the resultant conclusion will be greatly expedited.

"This is your Association; your officers, striving to serve you, can do so only by planning research which you as members desire. Only by having such pertinent information can the vast amount of dormant thoughts which you have in your mind both consciously and unconsciously be brought to light, crystallized, and developed."

The letter was signed by Dr. Louis A. Olney, Chairman of the Research Committee; Dr. Harold W. Stiegler, Director of Research, and J. Robert Bonnar, Chairman of the Executive Committee on Research.

The questionnaire itself follows:

QUESTIONNAIRE ON RESEARCH

American Association of Textile Chemists and Colorists

Name .....

Firm .....

Address .....

.....

Section ..... Date .....

I. GENERAL FIELD OF YOUR INTEREST AND PERSONAL ACTIVITY

A. 1. Textile Material	Yarns	Woven Cloth	Knitted Fabric	Hosiery	Other
Fibers					
— a. Cotton	—	—	—	—	—
— b. Synthetics	—	—	—	—	—
Viscose	—	—	—	—	—
Acetate	—	—	—	—	—
Others	—	—	—	—	—
— c. Wool	—	—	—	—	—
— d. Silk	—	—	—	—	—
— e. Mixed	—	—	—	—	—
— f. Other (Glass, Bast, etc.)	—	—	—	—	—
2. Preparation	—	—	—	—	—
3. Dyeing	—	—	—	—	—
4. Printing	—	—	—	—	—
5. Finishing	—	—	—	—	—

B. Laboratory		
1. Research and Development	Mill	—
	Chemical	—
2. Analytical		—
3. Testing	Mill	—
	Commercial	—
4. Dye Application	Mill	—
	Manufacture	—
5. Finishes	Mill	—
	Manufacture	—
6. Textile Chemicals and Specialties	Mill	—
	Manufacture	—
7. Consulting		—
8. Other (name)		—

C. Mill		
1. Preparation	(Desizing	—
	(Scouring	—
	(Boil-off	—
	(Bleaching	—
	(Mercerizing	—
2. Dyeing		—
3. Printing		—
4. Finishing		—

D. Technical Service	
1. Dyes	—
2. Chemicals	—
3. Finishes	—
4. Auxiliaries and Specialties	—
5. Weaving	—
6. Preparation	—

II. PERSONAL DATA

A.	Testing Lab	Plant	Research	Sales	Technical Sales Service
— 1. Chemist	—	—	—	—	—
— 2. Technical	—	—	—	—	—
— 3. Production	—	—	—	—	—
— 4. Administrative	—	—	—	—	—
— 5. Salesman	—	—	—	—	—

B. What are your personal interests in the wet processing of textiles, or in the textile chemicals field? Please list the nature of the problems. e.g. Dye application, finishes, etc.)

C. Please list specific problems you and your particular industry are interested in which would lend themselves to mutually beneficial research. (Old and new problems.)

D. Would you be willing to work cooperatively with others in your vicinity who have similar interests?

E. Can you offer reasonable use of your facilities and time on a problem of mutual interest and value to your industry and to yourself and cooperating friends?

Facilities—; Time—.

F. What basic problems in your Section could the Association sponsor and support? (Exclusive of the specific group efforts within your Section previously discussed.)

G. Constructive comments regarding AATCC research, funds, etc.

One Hundred and Forty-Ninth and Fiftieth Meetings of the Research Committee

THE 149th meeting of the Research Committee on Saturday morning, December 14, 1946, was open to all attending the convention at the Hotel Statler in Boston; and was devoted to a review of the accomplishments and plans of the Committee, as reported in the AMERICAN DYESTUFF REPORTER of April 21, 1947.

The 150th meeting followed the Council meeting in New York on Friday, March 21, 1947, with Chairman Louis A. Olney presiding. Present were J. Robert Bonnar, Chairman of the Executive Committee on Research; Harold W. Stiegler, Research Director; H. C. Allen, A. I. Anderson, W. D. Appel, E. C. Atwell, K. H. Barnard, G. L. Baxter, W. H. Cady, E. S. Chapin, W. W. Chase, M. A. Dahlen, J. N. Dalton, C. W. Dorn, C. Z. Draves, E. J. Driscoll, W. C. Durfee, A. W. Etchells, W. F. Fancourt 3rd, H. E. Hager, S. L. Hayes, A. J. Heinzmann, A. E. Hirst, W. A. Holst, R. W. Jacoby, N. A. Johnson, A. J. Kellner, W. Klaas, D. P. Knowland, H. W. Leitch, L. S. Little, J. E. Meili, W. R. Moorhouse, A. D. Nute, W. F. Prien, C. N. Rabold, J. R. Redmond, B. A. Ryberg, C. H. A. Schmitt, J. H. Skinkle, R. H. Souther, R. B. Smith, W. Stump, H. B. Sturtevant, H. H. Taylor, P. Theel, F. R. Tripp, J. F. Weller, H. E. Wilde, P. J. Wood, and H. C. Chapin, Secretary.

The Chairman outlined the procedure under which a sub-committee presents a test method for adoption by the Research Committee, which first votes it a "tentative method"; then after a year or more the sub-committee, having amended it if necessary, again presents it for adoption as a "standard method." Mr. Bonnar reported for the Executive Committee on Research, with particular reference to measures under way for keeping the members of the Association more generally informed on the progress of work under direction of the Research Committee; and more interested, both in this work and local research projects. To the same end, the Chairman of the Research Committee again asked for frequent written reports from sub-committees, marked whether or not for publication.

Dr. Stiegler discussed work in Lowell on the detergency machine, on dimensional restorability for which the machine under test seemed to be giving consistent results on cotton, on water repellency, and on the Quartermaster and C.W.S. projects. He reported progress on the International Salt Co. comparison of sodium chloride and sulfate as dyeing assistants in the Lehigh University laboratories. He raised the question as to how far sub-committee meetings should be open to visitors and the press. There seemed to be little doubt that they should be open to other members of the Association to the extent that the individual committees were willing. It was voted that meetings of the Research Committee and sub-committees be closed to the press, with the exception that members of the press should not be barred from officially declared open meetings of the Research Committee; but it was generally recommended that the press be given more prompt and complete releases. In the discussion it was again emphasized that it is not the policy of the Association to back legislation on trade standards, even though it does provide tests upon which such legislation may be based.

Mr. Barnard reported on the initial meeting of a new sub-committee on Non-Woven Fabrics. In discussion of a written report from Mr. Prisley, Chairman of the Detergency Committee, Dr. Stiegler stated that future changes in the detergency machine would be but minor, and applicable to machines under construction. Further work was planned for publication to show extent to which consistent results might be expected on various fabrics. Experiments in development of a standard soiled fabric were under way.

Mr. Seibert presented a tabulation of comparative results on cotton in commercial laundering and the Launderometer, showing desirability of a test method producing more color losss through abrasion than does the present number three test of the Association. Work on such a test is under way in Lowell. The Atlas Electric Devices Co. has provided new experimental metal containers with fins to raise and drop balls on the fabric. Comparison of commercial laundries, home laundering and the Launderometer on fabrics of synthetic fibers is being conducted by Professor Mary Shelton at the University of Tennessee. At a recent meeting of the Hosiery Division of the Committee in Greenville, S. C., there were discussed the results of inquiries on tests already in use by various laboratories, which seemed to lack supporting evidence of their ability to duplicate the results of actual laundering. This group is now engaged in a study of such laundering for the purpose of developing tests to duplicate its effects. Composed largely of hosiery dyers, it is anxious to establish recognized tests which will permit production and sale of better goods at prices commensurate with proved value and cost. Members of the committees on Wash Fastness and Dimensional Change have been appointed to establish cooperation in the work of the two committees, particularly in Lowell. In all its work the Wash Fastness Committee has to contend with variability of procedure among commercial laundries, making it difficult to determine what constitutes the treatment to be duplicated in laboratory tests. The same is true of dry cleaning also, and the problem is further complicated by new procedures introduced from year to year to effect more thorough washing or dry cleaning at competitive costs, but often at greater danger to the dye. The committee hopes eventually to study possible correlations between dye and fabric damage.

Reporting for the committee on Dimensional Changes in Textile Fabrics, Dr. Coughlin stated that on rayon fabrics partially stabilized by two washings in various ways, further change in home laundering could be predicted by laboratory tests. On materials less well stabilized, by but one preliminary laundering, the agreement between laboratory and home laundering in further dimensional change was not so good, and required further study. In work under consideration on woolens, distinction would have to be made between shrinkage of fabric, and shrinkage of finished garments such as hosiery and sweaters.

Reporting on Fire Resistance, Mr. Redmond stated that groups from his committee had been assigned to consider applicability of the committee's test to clothing, draperies and decorative fabrics, coated fabrics, unsupported films, and canvas

utility fabrics. Data on tests was being supplied to various public agencies, but contrary to certain published impressions, no legislation was backed, nor flame proofing treatment of fabric approved, by the committee. The committee's test method for fire resistant canvas had been used on millions of yards of coated fabrics. More severe tests, such as the Boston test, were in use, and manufacturers still had to know where a fabric would be used in order to meet legal requirements.

Mr. Allen was introduced as the new Chairman of the Committee on Water Repellency. He reported that data presented at a New York meeting in January by Mr. Slowinske was being published in the REPORTER of March 10. As the result of extensive comparative tests the du Pont Rain Tester had been selected as most nearly duplicating the effect of actual rain, and was recommended as a tentative standard of the Association. It was so voted.

On motion of Dr. Hager, the procedure involving the Flammability Tester was voted a standard method of the Association, to be recommended to the National Bureau of Standards for incorporation in its commercial standards. Approved by the Research Committee this was referred to the reconvened Council and voted. Dr. Hager reported a new division of his committee under Mr. Blegen, studying flammability of plastic films and coated textiles.

Mr. Holst reported that the Light Fastness committee had found Fadeometer inconsistencies in comparison of National Bureau of Standards calibration papers on AATCC wool standards which had led to recommendation of an attachment to fix sample holders in vertical position, matte paint to cover bright metal, and the use of wet and dry bulb thermometers to determine humidity in the machine. More calibration papers were to be distributed to the committee for tests under better controlled conditions, and if these showed results from paper and cloth standards in substantial agreement, paper and standard exposures were to be made available to the industry generally for trial.

On motion of Dr. Draves it was voted that any test method of the Association, now variously designated in the Year Book, be called either a "tentative test method" or a "standard test method." On motion of T. R. Smith, by letter, the Accelerated Ageing Test for Textiles Dyed with Sulfur Colors was changed from a tentative to a standard test method.

Mr. Knowland reported for the committee on Color Transfer, with special reference to work on a viewing device for comparing samples. Professor Theel reported progress in compiling a much larger edition of Analytical Methods, through a steering committee meeting twice a month in Philadelphia and correspondence with authorities in other parts of the country. Mr. Dalton reported plans of a reorganized committee on Perspiration, involving investigation of the plate method of test, and the effect of salt. Mr. Klaas described the new multifiber fabric soon to be available, containing silk in addition to the other six fibers, and of a sturdier construction weighing 25 per cent more per yard. It is to be furnished in two inch strips to facilitate cutting into samples, but will be available in full cloth width for those who desire it.

Respectfully submitted,
H. C. CHAPIN
Secretary.

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Meeting, Philadelphia Section

THE Philadelphia Section meeting was held on May 23, 1947 in the North Roof Garden of the Bellevue-Stratford Hotel.

Walter Fancourt, III, Chairman, asked Elmer C. Bertolet to introduce Dr. Frederic Dannerth, one of the oldest textile ment in this section.

Mr. Fancourt then introduced Dr. Miles A. Dahlen, who gave a short talk on "The Effect of Dyestuffs on the Temperature Rise of Fabrics Exposed to Light". A colored movie, prepared by Richard Stehle, was given in connection with the talk.

Following the presentation of the above, questions were submitted and answered by experts. Dr. Carl Schlatter, American Viscose Corp., F. B. Milligan, Industrial Waste Engineer of the Sanitary Water Board of Pennsylvania, Ross Taber, duPont—Nylon Division, Joseph Lopez, duPont— Nylon Division, and George A. Slowinske, also of duPont, were among those that answered the questions which will be published along with the answers in the American Dyestuff Reporter.

A vote was taken to have the meeting place changed from the Bellevue-Stratford Hotel to Kugler's at Broad and Chestnut Streets for our next meeting of September 26. Those present were reminded of our Outing, June 13 and our Formal Dance to celebrate our 25th anniversary on November 8 at the Bellevue-Stratford Hotel.

There were 100 present for dinner and 120 for the meeting.

Respectfully submitted,
A. E. RAIMO, *Secretary.*

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Summer Meeting, South Central Section

THE Summer Meeting of the South Central Section was held in the Hotel Patten, Chattanooga, Tennessee, June 7, 1947.

At the afternoon Technical Session Dr. O. M. Morgan of National Aniline Division, Allied Chemical & Dye Corporation, gave an interesting talk on "Modern Aids to Cleanliness." A question and answer period was held following the talk.

The Fall Outing definitely will be held on September 5th and 6th at the Lookout Mountain Hotel. The Outing will be sponsored solely by the South Central Section, but invitations will be extended to all other sections. Committees for the Fall Outing were appointed at the Spring Meeting and plans are going forward for a beneficial as well as enjoyable outing.

Dr. Raymond Seymour is working on a Sectional paper and hopes to complete it soon.

After the banquet the membership was shown a color film on the manufacture of sports equipment.

Respectfully submitted,
C. A. SPRATT, *Secretary.*

Purpose of the Chicago Convention

The Boston Convention commemorated the 25th Anniversary of the founding of our Association, rounding out an important era in the development of products and processes used in the textile industry. That quarter century also roughly coincided with that period in world affairs between the ends of the two World Wars.

With the exigencies of war now laid aside—we all hope, permanently —our industry faces a brilliant future of great development. What the next 25 years can bring in new textile fibers, dyeing and finishing improvements, would take a bolt prophesy.

Through the collective research which this Association affords, as well as through our individual efforts, we will have incentives to point out the directions our progress should take.

Therefore, the Mid-West Section cordially invites you to this Convention, hoping your attendance will profit you in suggesting ways for the improvements constantly being made and that you may again enjoy the benefits of good fellowship.

Applied Research Session

Silver Jubilee Convention, Boston, Mass., December 13, 1946

THE Applied Research Session convened at two-thirty o'clock in the Ballroom of the Hotel Statler in Boston, with Walter J. Hamburger presiding.

Chairman Hamburger: The meeting will please come to order. This is the second portion of the research presentation. The three papers to be presented this afternoon will be on the applied aspects of research, in contrast to those of this morning, on the fundamental aspects of research.

President Kenneth Fox of Lowell Textile Institute will preside at this afternoon session. I now take pleasure in presenting President Fox as the presiding officer of the afternoon session! [Applause]

[President Fox then assumed the Chair.]

Chairman Fox: As Mr. Hamburger has pointed out to you, the emphasis this afternoon is going to be on the applied phase of research, rather than the fundamental phase of it.

The first paper in this Applied Research Session is on wool, and has as its title the "Theory and Practice in Wool Dyeing"—we hear a great deal about the international scope of the activity of the AATCC, and I think the first speaker is a manifestation of just how far the influence does reach.

Our speaker is Frederic L. Goodall, who comes to us from England and is a member of the firm of Geigy Company, Ltd. of Bradford, England.

Mr. Goodall! [Applause]

[Mr. Goodall then presented his prepared paper on the above subject.]

Theory and Practice in Wool Dyeing*

F. L. GOODALL, M. Sc., F.R.I.C.

Research Staff, The Geigy Company, Ltd., Bradford, England

WOOL dyeing recommendations for acid and afterchromed colors have remained basically unchanged for about three quarters of a century. They may be summarized in the following typical instructions.

"Prepare the dye bath with the necessary amount of dye, 10% Glauber's Salt and x% of the recommended acid. Circulate to insure uniform distribution and enter the goods at 105° F. Run 15 minutes without steam. Raise to boil in 45 minutes and boil 60 minutes."

Such instructions depend on the following four principles:—

1. That acid is necessary in order to make the color exhaust.

2. That the stronger the acid and the greater its concentration, the more rapid the rate of exhaustion.

3. That the presence of Glauber's Salt retards the rate of dyeing.

4. The lower the temperature, the slower the rate of dyeing.

These principles are often considered to be all that is necessary for success in wool dyeing and since millions of tons of wool have been dyed with every satisfaction in accordance with them, they must have very considerable value.

The basis on which modern theory explains acid dyeing phenomena is the titration curve of wool of which a simplified version of Speakman's results for hydrochloric acid systems is shown in Figure 1. The curve shows that wool has a maximum combining capacity for hydrochloric acid of the order of 80 ml N acid per 100 grams of wool. This combination occurs between the acid and the basic side chains in the wool and the maximum occurs at pH 1.0 approximately. The same maximum value of approximately 80 ml N acid per 100 grams of wool has been found by many authors, at least at dyeing temperatures below 140° F., to hold equally well for dye acids in combination with wool. Usually, however, the pH at which maximum dye combining capacity occurs is somewhat higher than that which holds for hydrochloric acid. There seems little doubt that in a general way, acid wool dyeing is a chemical reaction between dye anions and basic side chains in the fiber.

The interest in the titration curve for our present purpose lies in the fact that the acid combining capacity, whether for colorless acids or for dye acids, is a function of pH and rises from a minimum at about pH 5 to the previously mentioned maximum at pH 1.

It is a reasonable assumption that what may be described as the "attractive force" of the fiber for dye anions is proportional to its acid combining capacity under any given conditions and it is further reasonable to postulate that rate of dyeing must be equally proportional to this "attractive force." In consequence, rate of dyeing is a function of pH and the acid titration curve of wool provides the explanation of the effect of acid, as regards quantity and strength, on dyeing rate summarized in principles 1 and 2.

The third principle of the retarding effect of Glauber's salt can be explained by the Donnan Membrane Theory or, in simple language, by competition between sulfate anions derived from the Glauber's salt and dye anions for the available basic groups in the wool. The effect of Glauber's salt in sulfuric acid baths should be imitated by systems containing equivalent quantities of other anions such as chloride or phosphoric anion—if either of these theories is wholly correct. Unfortunately, there is evidence in Table 1 to show that Glauber's salt has a specific retarding effect of its own for which no ready explanation is available.

* Presented at Applied Research Session, Silver Jubilee Convention, Boston, Mas., December 13, 1946.

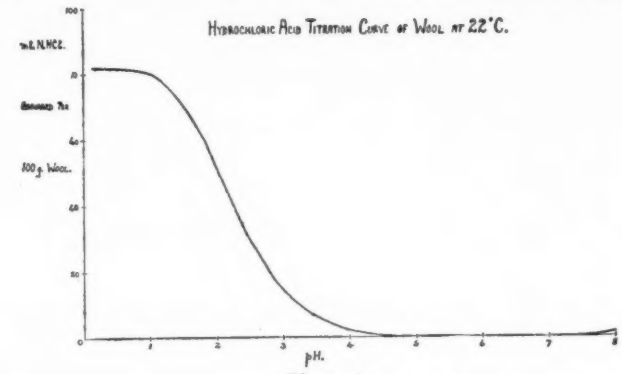

Figure 1

TABLE I

Sodium Ion Concentration	Sulphuric Acid Dyebath		Hydrochloric Acid Dyebath		Phosphoric Acid Dyebath	
	Percent absorption	Final pH of bath	Percent absorption	Final pH of bath	Percent absorption	Final pH of bath
Nil	97.8	2.39	98.9	2.36	99.6	2.28
0.0176 M	93.2	2.39	98.3	2.36	99.1	2.45
0.0352 M	87.6	2.43	98.0	2.42	98.6	2.55

NOTE: 0.0176 M and 0.0352 Sodium ion concentrations correspond in the sulphuric acid dyebath to 5% and 10% respectively of anhydrous Glauber's Salts calculated on the wool weight.

If it is accepted that acid wool dyeing is a chemical reaction, the fourth principle, i.e. that rate of dyeing increases with increasing temperature, is glibly explained by saying that, like many other chemical reactions, it proceeds more rapidly with increasing temperature. This, however, is a superficial view because, although the driving force in wool dyeing is no doubt chemical, as a chemical reaction it is complicated by physical factors, realization of which is important from both theoretical and practical points of view. These physical factors, in many cases, have a greater bearing on rate of dyeing than would be expected from the simple chemical theory of wool dyeing.

The greatest single physical factor is the relationship between the size of the fiber pores through which dye must pass into and out of the fiber and the size of the dye particle itself. It is impossible to dye a dry fiber because the pores of the fiber have an approximate size of 6A which is much too small to permit the passage of any dye molecule. Before dyeing can proceed, swelling must take place and, obviously, the greater the degree of swelling, the greater the physical ease with which dye particles can pass in and out of the fiber. Swelling is considerable when in contact with water alone and is increased in the presence of acid and, particularly, by raising the temperature above 110° F. The presence of Gauber's salt in acid systems has a tendency to reduce swelling.

The other side of this very important question of the physical ease of movement of dye through the fiber is the size of the dye particle itself. Although ordinary wool dyes are soluble in water, the nature of the solutions which they give can range from crystalloidal solutions containing single molecules of dye to highly colloidal solutions containing very large aggregates of many dye molecules.

The usual effect of adding acid or Glauber's salt to aqueous solutions of dyes is to cause increased aggregation and, consequently, increased particle size of the dyes in solution. In passing, we may note that the effect of Glauber's Salt on fiber size and dye particle size is, in both cases, such as to promote an increase in the physical difficulty of movement of the dye through the fiber.

The effect of temperature on the state of dye particles in solution is invariably that rise of temperature causes breakdown of the dye aggregates to such an extent that it is now believed that every normal wool dye in solution near the boiling point is effectively in molecular dispersion.

Dyes giving crystalloidal solutions are those which can pass most readily through the fiber and, consequently, are the level dyeing acid dyes of poor fastness to washing, perspiration and other wet treatments. A very typical example is Acid Orange GG (Colour Index No. 27) which has been shown by Valko to be molecularly dispersed in solutions under conditions varying from 80° F. to 195° F. and to remain so in the presence of 0.02 M sodium chloride or in N sulfuric acid.

Dyes giving colloidal solutions at normal temperature are usually the more uneven dyeing types of higher fastness to wet conditions of treatment and an equally typical example is Polar Yellow R Conc. (Pr. No. 152). Valko has established that this dye, at 195° F., in solution in 0.05 M sodium chloride, exists in particles not larger than two molecules whereas at 140° F. and 80° F. the average number of molecules of Polar Yellow R Conc present in a single particle is of the order of 50-60 and 500 respectively.

If the aim of true dyeing is to distribute the dye uniformly within the fiber and in as fine a state of division as possible, this end is at all times possible from start to finish of the routine technical application of dyes like Acid Orange GG, with which the chemical reaction between fiber and dye can proceed with the minimum of physical interference.

It is obvious that the large average size of Polar Yellow particles, in relatively cool solutions, may introduce a very serious physical obstacle to the entrance of the dye particles into the fiber in the early stages of the routine dyeing method.

In actual experiments in applying a large excess of dye, it has been shown that at about pH 2.5 at 70° F. the wool fiber can only take up about 1/250th of the possible maximum take-up of Polar Yellow at the boil and even at 140° F. the fiber can still only take up 1/10th of its maximum.

The same sort of effect can be seen under conditions where the amount of dye present is not in large excess, i.e. in a normal wool dye bath containing 3% Polar Yellow R Conc and the usual acetic acid addition. If five such dye baths are maintained respectively at temperatures of 70, 105, 140, 175 and 212° F. until the dyeing system reaches equilibrium and the percentage dye absorption is then measured colorimetrically, the results obtained can be graphed according to Figure 2.

In this figure, curve B refers to Polar Yellow R Conc whilst curve A represents 3% Acid Orange GG, dyed with 3% sulfuric acid under the same conditions. Whereas Acid Orange GG gives practically a uniformly straight line, approximately 100% absorption is not obtained with Polar Yellow R Conc at temperatures lower than 175° F. As this temperature falls, the degree of absorption also falls and only amounts to some 25% at 70° F.

Since solutions of Polar Yellow R Conc of *average* particle size 50 molecules, or for that matter, 500 molecules, presum-

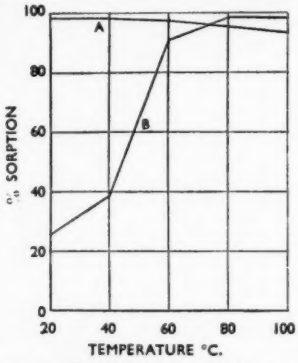

Figure 2—Equilibrium sorption curves for 2% Acid Orange GG (A) and 2% Polar Yellow R Conc. (B)

ably contain particles of all sizes ranging from single molecules upwards, these experimentally established facts can only be due to the fiber pores becoming clogged with the larger particles of dye. The existence of dye in large particles in low temperature "dyeings" of Polar Yellow R Conc can readily be seen under the microscope and leads technically to very inferior rubbing fastness and a further interesting consequence. This is that the shade is much weaker and markedly duller and redder in tone than would be given by the same dye content of the fiber if applied normally at the boil.

In the table II are given the percentage exhaustion figures for the dyeings shown graphically in Figure I and an assessment of their shade characteristics against normal dyeings made at the boil. If one of the low temperature dyeings of Polar Yellow R Conc is treated for a short time in a blank acid bath at the boil it will develop up to the true normal shade corresponding to the amount of dye present, owing to the increased temperature of the blank bath encouraging the breakdown of the dye particles into approximate single molecules followed by true dyeing. Such experiments indicate that true dyeing with Polar Yellow R Conc does not occur until a temperature rather higher than 175° F. is reached.

Possibly a better p;icture of the interrelationship between colloidal dye and fiber pores may be obtained by reference to Figure 3 which represents in diagrammatic form, not to scale, these relationships in normal dye baths (3% Polar Yellow R Conc, 4% acetic acid 40%, at 70, 105, 140, 175 and 212° F. and also at 70° F. in a dye bath consisting of 50% solution of acetic acid.) The varying size of dye particles is indicated by a series of vertical lines of varying length appearing in triangular form, the apex of the triangle of course representing particles of single molecules. With increasing temperature the size of the triangle on this diagrammatic illustration, naturally decreases until at 212° F. it disappears and would become a collection of points representing the approximate mono-molecular dispersion at this temperature. The variation in fiber swelling due to change of temperature and to the use of 50% acetic acid is represented by the distance apart of the two walls of the single imaginary fiber pore.

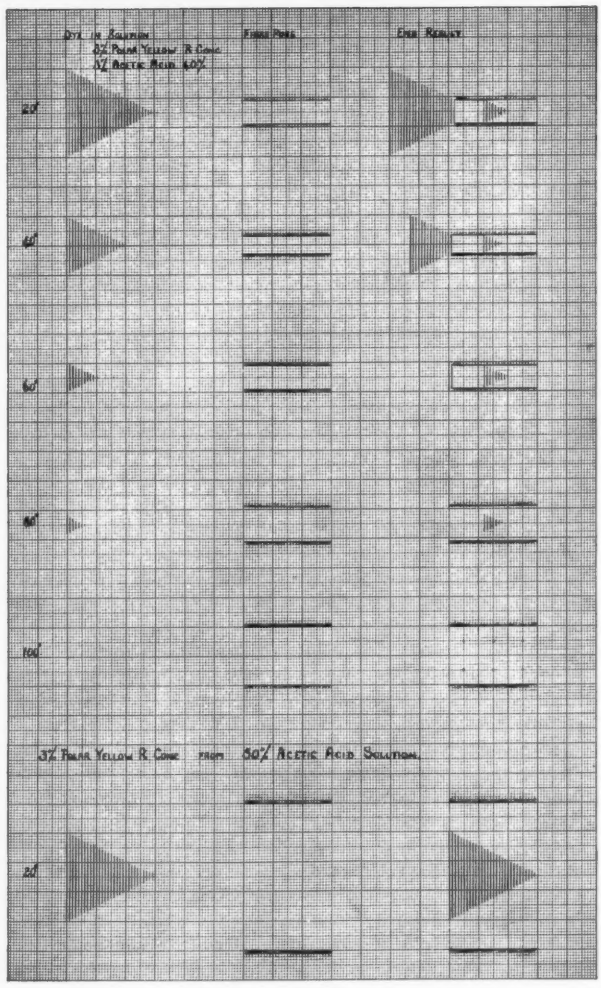

Figure 3

TABLE II

Shade comparisons of 3% Polar Yellow R Conc dyed at various temperatures against dyeings at the boil.

Temp. Degrees Fahren.	*Actual Dye Scorption*	*Dye Required at 212° F. to give approx. equal depth*	*Remarks on shade*
70	0.81%	0.08%	Gradual progression from 70° F. much redder, duller and skittery to 175° F. slightly redder and duller than equivalent depth dyeings at 212° F.
105	1.11%	0.17%	
140	2.73%	0.9%	
175	2.94%	2.94%	
212	2.94%	2.94%	

The degree of exhaustion of the dye bath is indicated by the number of vertical lines, obviously larger than the fiber pore diameter, which remain outside of the fiber pore at the conclusion of the dyeing.

The blocking of the fiber pores by large particles at the lower temperatures is thus clearly indicated and one result of the position of these particles at the entrance to the fiber pores, and therefore

on the surface of the fiber is, of course, poor fastness to rubbing.

Weakness, redness and dullness of shade against the true normal dyeing is to be expected in varying degree wherever in the final state large particles exist in the fiber pore, i.e. at all experimental temperatures less than the boil.

Let us now consider what really happens if the routine recommendation for acid dyeing is applied to a typical colloidal dye like Polar Yellow R Conc.

Assuming that the wool is entered at 105° F. into the dye bath prepared with the necessary amount of dye and acetic acid, the first reaction is that a considererable portion of the acetic acid is taken up by the wool, which becomes positively charged. The negatively charged aggregates of dye anion are thereby attracted to the fiber and are deposited thereon, and to some extent therein. The speed at which this is accomplished is difficult to measure experimentally but it occurs within one minute, resulting frequently in practice in an initial uneven "strike." The unevenness of "strike" can only be smoothed out at 105° F. by continued circulation of goods or dye bath, provided that the dye bath contains sufficient dye for *all* the wool fibers to reach the same standard of "clogging" with coarse dye particles. This would be the case with 3% Polar Yellow R Conc but not with lesser amounts such as 0.5%. The lighter the shade intended to be dyed, therefore, the greater the danger of unevenness occurring in the first few minutes of dyeing, and since colloidal dyes do not migrate with any ease, even when the dye bath temperature reaches the boil, this initial unevenness will persist and be very difficult to correct. As the dye bath temperature increases, the dye particles become progressively reduced in size and the fiber swells. At some temperature, dependent on the dye and the dye bath conditions, it becomes physically possible for all the dye present to be taken up by the fiber and the dye bath may in consequence become exhausted. It does not follow that at this temperature the dyeing is complete, because, in spite of complete exhaustion, the dye taken up may still be in coarser particles in the fiber than would be the case at the boil. At some still higher temperature the dye particles become so reduced in size that they become approximately single molecules and it is possible for the dyeing to achieve its final form.

Using 3% Polar Yellow R Conc and 3% acetic acid 40%, this picture of the colloidal dyeing process is graphically shown by curves B 20 and B 40 in Figure 5 which represents the progress of routine dyeings in which the goods are entered at temperatures of 70° and 105° F. respectively. The first step is the initial deposition of large particles of dye, followed by a relatively stationary period and a sudden increase in dye sorption after attaining a temperature of about 140° F. In the same Figure, curves A 20 and A 40 refer to similar dyeings made with Acid Orange GG and sulfuric acid in which the absorption of dye is uniform and regular throughout.

In order to make the process of take-up of a colloidal dye like Polar Yellow R Conc as nearly ideal as possible, it is necessary to have at all stages of the dyeing the dye present in minimum particle size with the fiber in a state of maximum swelling. The first and most important means of achieving this end is to maintain the dye bath throughout at a temperature above 175° F. and Figure 6 shows the effect of altering the tempera-

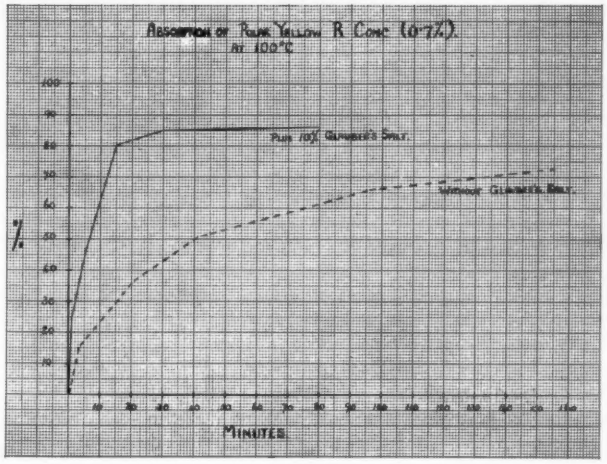

Figure 4

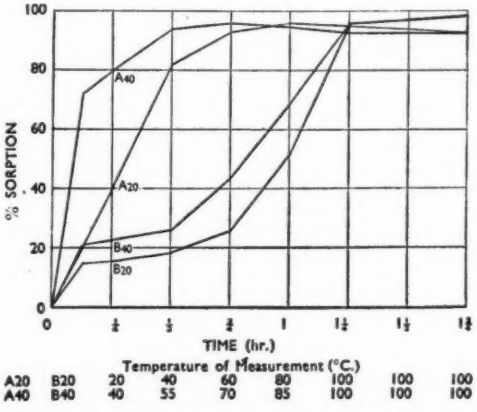

Figure 5. "Practical" dyeing curves for 2% Acid Orange GG (A20 and A40) and 3% Polar Yellow R Conc. (B20 and B40).

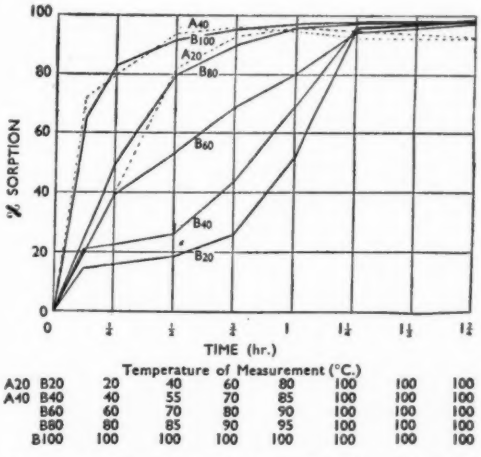

Figure 6. "Practical" dyeing curve for 2% Acid Orange GG (A 20 and A 40) and 3% Polar Yellow R Conc. (B 20, B 40, B 60, B 80, and B 100).

ture of entering the goods on the rate of dye pick-up.

Curves B 80 and B 100 representing dyeings commenced at 175° F. and the boil respectively, now show similar form and rate of absorption to Acid Orange GG dyed according to routine methods beginning at 70° F. and 105° F. respectively.

The second alteration of the routine dyeing method rises from a consideration of the effect of Glauber's Salt in colloidal dye baths. It has already been stated that Glauber's Salt tends to reduce swelling and increase the particle size. In consequence, its presence promotes physical difficulty in the free passage of dye and, in short, the maintenance of the dye bath as free from dissolved salts as possible should be a decided advantage. In fact, the presence of Glauber's Salts in colloidal dye baths at the boil accelerates the rate of dyeing as shown in Figure 4 in consequence of its effect in increasing the colloidal character of the dye.

Whether the dye is colloidal or crystalloidal, the rate of sorption of dye is still dependent on the acidity of the dye bath, on which, in turn, the activation of the basic groups in the wool depend. In view of the fact that colloidal dyes possess negligible migration properties, little reliance can be placed on migration correcting unevenness once it has occurred, and it is essential therefore that every effort should be made to obtain uniform, and therefore very gradual take-up of dye throughout the drying process. The simple transformation from commencing a dyeing at 105° F. with Glauber's Salt to commencing it without Glauber's Salt at a temperature near the boil would not lead, under bulk conditions, to satisfactory results.

It is impossible in practice to enter material in such a way that all the material comes into contact with the dye liquor simultaneously. The portions of the batch first in contact with the dye liquor would absorb considerably more dye than those coming into contact with it later. It follows, that in order to obtain success by high temperature entering without Glauber's salt, the rate of exhaustion must be reduced, particularly at the start of the dyeing. This aim is achieved by reducing the acidity of the dye bath.

The considerations thus briefly put forward lead to the suggestion that alteration of the routine dyeing method in three respects; namely,

1. entering the goods as near the boiling point as possible.
2. complete absence of Glauber's Salt.
3. reduction of the initial acid content of the bath would lead to a more successful means of applying colloidal dyes. This expectation has been amply proven in practice and, for reasons already given, the dyeings obtained are generally much more level and solid, brighter in shade, of better fastness to rubbing and, in particular, one of the most outstanding technical results is the extremely high degree of penetration achieved on difficult batches.

In practice, the simplest and best method is to raise the dye bath to the boil for entering, and enter the goods with the steam shut off. Some time should be allowed for circulation without steam in order to ensure uniform contact between dye solution and goods. Owing to the entry of cold goods and loss of heat during this period, the temperature in practice may fall to 185° F. from which it is then raised to the boil in 30 minutes and dyeing then carried on as usual.

. . . Because of the limitations on weight in air travel, it was not possible to display all the bulk results which have been obtained but a few typical samples shown were the following. . .

1. Yarn Dyeings in Hank Form—

	Colour Index No.
Royal Blue formula:	
1.33% Brilliant Wool Blue BL	833
0.2 % Erio Fast Red 4BS	
0.07% Erio Fast Yellow RS	Pr. 187
Maroon formula:	
2.35% Erio Chrome Red B	652
0.67% Erio Chrome Brown R	98
0.06% Erio Chrome Drange 2RC	274
Dark Brown formula:	
2.75% Erio Chrome Brown SWN	
1.3 % Erio Chrome Red B	652
0.45 Erio Chrome Orange 2RC	274
0.14% Erio Chrome Grey 3GL	
Dark Green formula:	
0.7 % Polar Yellow G Conc	642
0.9 % Wool Fast Green B	
0.11% Polar Orange R Conc	Pr. 152
0.25% Brilliant Wool Blue BL	833
Red formula:	
3. % Polar Red GRS Conc.	430
Medium Brown formula:	
1.15% Erio Chrome Brown SWN	
0.25% Erio Chrome Orange 2RC	274
0.25% Erio Chrome Red B	652
0.175 Erio Chrome Grey 3GL	

2. Yarn Dyeings in Cheese Form—

Dyed with 3% Polar Red R Conc	430

3. Piece Dyeings on Felt—

Dyed with 4.5% Erio Fast Blue S5R	289
1.0% Ammonium Sulphate	
0.5% Ammonia 0.880	
0.25 Bichrome	

4. 8 oz. Fine Worsted—

Dyed with 0.12% Polar Brilliant Blue 3R
0.055 Polar Brilliant Blue RAW
1. % Ammonia 0.880
1. % Ammonium Sulphate

Discussion

Mr. Rizzel: Has there been any work done on the control of the pH during the process of dyeing by using a buffer system that you could alter at will.

Mr. Goodall: Well, the answer, sir, is "No" because of this really important feature in the high temperature method of dyeing, of avoiding all salts as far as possible. I realize that it is an attractive thing theoretically, but I think that would militate against it.

Mr. Byron: Mr. Goodall, has the grease content of the wool any bearing on the rate of exhaustion?

Mr. Goodall: I don't think it has, from a practical point of view.

E. I. Valko: Mr. Goodall emphasized the significance of physical factors, such as swelling, in the mechanism of dyeing, particularly insofar as the dependence of dyeing on temperature is concerned. I agree with Mr. Goodall that the physical factors including swelling, should not be neglected.

Based on the assumption that swelling is the governing factor in the dependence of the dyeing on the temperature, Mr. Goodall was able to enrich the technique by devising a novel method of wool dyeing. We may be tempted to consider the success of this method as proving the validity of the assumption. Unfortunately, however, we are not justified in doing this. Other assumptions, for instance, that the governing factor in this dependence is the energy of activation of the diffusion of the absorbed dye molecules, is likewise capable of forming the theoretical basis of Mr. Goodall's novel dyeing process. Therefore the question remains open as to how significant swelling is in the dependence of dyeing on temperature.

Mr. Goodall's second figure shows an increase in equilibrium of absorption of Polar Yellow R with increased temperature. I would like to ask Mr. Goodall whether or not the word equilibrium should be set off in quotation marks. For if the values represent true equilibrium, dyeing would be, contrary to the general belief, an endothermic process. True equilibrium, however, implies reversibility, which in this case, would mean that the dye bath in equilibrium with the wool fiber would release some of the absorbed dye on cooling. This appears quite improbable.

Mr. Goodall: The equilibrium is practical, in the sense that dyeing is stopped and the important consideration is that it is not a reversible equilibrium.

James Roit: What is your experience, as far as hosiery dyeing is concerned? I recently met a couple of Englishmen who happened to know Mr. Goodall very well, who were slightly disillusioned, when meeting this problem. Have you ever tried dyeing hosiery, at the boil, and do you get good results?

Mr. Goodall: The last speaker has raised rather a stinker. He referred to two English friends of mine. The point, as I see it, is the penetration of seams and toes with colloidal dyes, which is

obviously a difficult thing. I have not personally tried to apply colloidal dyes to hosiery, but I would say this. In my experience, the only way of applying reasonably level dyeing colors to hosiery to get complete penetration of heels and toes and seams, is to enter those dyestuffs at the boil, and that was in fact a common trade practice and still is in England, long before I ever thought of the "high-fallutin'" scientific explanation.

What I would claim, in answer to the last speaker, is that entering at the boil, with colloidal dyes, may not give you penetration of such difficult parts of the fabric, but certainly will give you much better penetration than if you entered it at low temperatures.

Chairman Fox: The second paper is "Fundamental Principles Applied to the Elimination of Fire Hazards of Fabrics." I do not need to dwell upon the importance of this subject, particularly in the light of some of the recent events. We have to confine our questions to about a ten-minute period, at the conclusion of each of the three papers, but I am very sure if there are additional questions unanswered, the various speakers will be willing to go into ab ull session with the appropriate parties.

Our speaker is well qualified to discuss the subject, and it gives me pleasure to present to the group Dr. Sidney Coppick of the Research Laboratories, American Viscose Corporation, Marcus Hook, Pennsylvania.

[Applause—Dr. Coppick then read his prepared paper.]

Chairman Fox: The next speaker, I am sure, is a stranger to none of us. He has many and diverse duties, being Director of Research for the Textile Foundation, Director of Research, Textile Research Institute, and his subject, I feel, is a timely one, and one that has been "cussed and discussed" a great deal in the last few years. The title of his paper is "Practical Problems in the Manufacture and Service of Tires Built with Continuous Filament Cord."

It is my pleasure to present to you Dr. John H. Dillon. [Applause]

[Dr. Dillon then read his prepared paper on the above subject.]

Practical Problems in the Manufacture and Service of Tires Built with Continuous Filament Cord*

J. H. DILLON

The Textile Foundation and Textile Research Institute, Inc.

Introduction

TO the textile man, a pneumatic tire may be considered as a toroidal shaped structure of cord fabric, built up of several bias-cut plies with the bias angle alternating plus and minus in successive plies. The cord plies are sized in a rather complicated manner, first being coated with a "dip" which is deposited from an aqueous dispersion of a rubber and a resin and next being calendered with a rubber "skim stock". This "sizing" serves to cement the plies together with a certain resilience and compliance between them. The structure is protected by abrasion-resistant tread and sidewall rubber compounds, and is given sufficient rigidity to hold to the wheel rim by steel bead wire. Now it is obviously true that, without the rubber "sizing" and abrasion protectors and without the steel bead, the structure could hardly qualify as a tire. Nevertheless, the cord body of the tire is its foundation, a flexible, resilient, and yet strong skeleton, which must support without much help from the rubber the inflation and impact stresses, and must withstand the elevated temperatures of operation which are produced by the flexing of the rubber and itself.

With this definition of a tire in mind, a critical and impartial review of the practical problems met in tire manufacture and service appears in order. This review will be concerned mainly with continuous filament materials and will refer to cotton cord fabric only for occasional necessary comparisons. The important subject of cost will not be discussed, and the problems of cord construction will be treated only briefly to permit a more extended consideration of the relative characteristics of various cord materials: viscose rayon, nylon, glass and steel.

Manufacturing Conditions

Woven fabric vs. creel method

There are two principal methods of applying tire cord in the tire manufacturing process, the fabric and the creel techniques. The fabric method is the older and employs woven fabric with a minimum number of light picks, just sufficient to hold the fabric together during processing but serving no useful purpose after the fabric is calendered with rubber. The picks are purposely made very light for it is desirable that they break in the expansion or later in service; otherwise, they may serve to produce localized stresses and abrasion on the cords. With rayon cord fabric, cotton picks are generally employed. The creel method is used by at least two of the large manufacturers. Its use eliminates the extraneous picks and permits individual tensioning of the cords in the dipping, drying and calendering operations. Hence, at least from a theoretical viewpoint, the creel method should give a tire with more uniformly stressed cords and eliminate the danger of "pick thread failures" which do sometimes occur, in spite of denials by the protagonists of the fabric method. The bagginess problem with cord fabric also is eliminated, of course, by employing the creel method. Nevertheless, it should be remarked that the fabric method involves much simpler dipping and calendering equipment and requires less factory floor space. Furthermore, the creel method is suitable only for long runs of a given type of calendered fabric. Thus, even though it is sometime definitely established that the creel method is superior, the large expenditures necessary to convert existing plants to it may delay its universal adoption for many years.

Initial Storage

The first operation upon receipt of cord fabric by the tire plant is storage. This is not as simple as it sounds for rayon fabric must be kept dry and, if the rolls are stored vertically in a heated warehouse, an appreciable vertical temperature gradient may cause a variation of moisture content across the fabric and certain types of bagginess can result. Special precautions against mildew are seldom taken since it is desirable for other reasons to keep the fabric dry and mildew is thus not a serious problem.

* Presented at Applied Research Session, Silver Jubilee Convention, Boston, Mass., December 13, 1946.

Dipping and Drying

The second operation with woven fabric is dipping and drying. For creel fabric, the dipping and drying operation can be combined with calendering so that the cord goes directly from the package through the dip and the dryer, and thence to the calender without interruption. Early dips used with cotton cord were benzol solutions of natural rubber and curing ingredients. The use of an inflammable and toxic solvent was dangerous, of course, and many fatal accidents occurred from explosions and poisoning of workers. Furthermore, loss of solvent by evaporation was serious and solvent dipping could be tolerated from an economic angle only with the use of an efficient solvent recovery unit. The advent of aqueous dips was a great advance in tire manufacture and was precipitated by the need for a satisfactory dip for rayon. The purpose of any dip, of course, is to attain adhesion between cord and rubber skim stock. High tenacity rayon has practically no specific chemical adhesion to rubber. However, when certain resins such as resorcinol formaldehyde and proteans are dispersed or dissolved in the aqueous dip along with the rubber, which may be natural or synthetic latex and/or a reclaimed rubber dispersion, reasonably good adhesion is obtained between cord and dip and between dip and rubber ply stock. Wetting agents are frequently employed in dipping rayon cord but must be kept at minimum concentrations to avoid foaming. After the much more satisfactory experience with aqueous dips in the rubber industry, it will be difficult indeed to persuade tire manufacturers to return to solvent dips in order to use some of the new high tenacity fibers which seem to demand them. The nature of rayon, of course, can hardly be considered compatible with aqueous dipping but the practical advantages of aqueous dips have far outweighed this factor.

After the fabric has emerged from the dip tank and passed through squeeze rolls it must be thoroughly dried. This is accomplished in various ways, can dryers, agitated air dryers, and festoon dryers. Drying is especially important with rayon but it must be remembered that moisture also has a plasticizing effect on nylon which cannot be neglected. Wet shrinkage of rayon and thermal shrinkage of nylon are phenomena which suggest the use of tension in the drying part of the operation and tension drying with as much as two pounds per cord is being practised in some plants. In reducing shrinkage, of course, the initial properties of stretch and strength are also better maintained. Hence, the festoon dryer appears to be on the road to obsolescence and another argument for the creel process with its possibilities of individual tensioning of the cords appears. Some evidence has been obtained, particularly with dips containing resorcinol formaldehyde, which indicates that not only must the cord fabric be thoroughly dried but that it should remain in the dryer for an additional period of time to permit the resin to "cure" or polymerize. In fact, this was the basic reason for employing festoon dryers with temperatures of 280° F. or higher. The current trend, however, seems to be away from this practice and toward the use of resins which do not require this additional time in the dryer. It should be remarked that glass and steel tire cord have definite advantages from the dipping and drying angle. Glass cord is not affected by water. Steel cord does not need to be dipped at all if it is plated with brass of the proper composition by the manufacturer and is stored at low humidity before calendering.

A word should be said about the effects of rayon finishes on adhesion. In general, the sulfonated oil type of finish has little or no effect on adhesion. However, the wax type finish, such as, for example, sorbitan palmitate used in the continuous spinning process, is not conducive to good adhesion, particularly if used in appreciable concentrations on the yarn. On the other hand, many adhesion failures have been ascribed to the finish which have been largely due to faulty drying techniques. Since most fabric failures are really adhesion or separation failures it would appear worthwhile for the rayon industry to attempt to develop a finish which not only is not detrimental to adhesion but actually promotes a chemical bond. Experiments in this direction are in progress. To look farther into the future, it might be well for the yarn manufacturer to undertake the development of dipped yarn to be supplied to the tire plant in a dry package. Such a program involves the old argument that the rubber should be applied by the rubber company. However, the possibility of the yarn manufacturer doing a better job of dipping than the tire plant now does appear rather good. Thus, it seems that this matter should be given attention, bearing in mind the possible advantage of steel tire cord which can be furnished ready for calendering by the wire manufacturer.

Storage after drying

The third operation is a vital one for rayon cord; storage after drying. The dip film on rayon cord is very thin and is not impermeable to moisture. Hence, if the dipped rayon cord is exposed to normal humidities, a considerable water regain takes place. It has been established by bitter experiences that a rayon tire built with a moisture content of more than 3 percent on the rayon has a definite weakness in regard to ply separation. In the early days of rayon tire development, after high tenacity rayon with reasonably low creep had been supplied, tires built in the summer were found to be subject to premature separation failures in an alarming degree. Finally, this problem was solved by storing the dipped and dried fabric in low humidity rooms (10 to 15 percent R.H.). The fabric is not removed from these dry rooms until needed for calendering. The function of this necessary operation as regards cord properties has never been explained completely although the increase in creep and reduction of strength caused by the increase in moisture content are certainly important factors. It has been shown *(1)* that the tensile strength of rayon decreases much more rapidly with increasing temperature for the higher regain values. If this conclusion can be extended to dynamic fatigue strength, it appears possible that the fatigue strength of the moist rayon in truck tires operating at elevated temperatures would be sufficiently low to produce localized cord failures which might grow into fabric separations. This reasoning is good up to this point. However, it must be recognized that rubber has a high permeability to water vapor, and experiments have been made which indicate that the initially dry rayon fabric of a tire would pick up a considerable amount of moisture under ordinary conditions of humidity and temperature *(2), (3)*. In any event rayon tires built with initially dry fabric have been found very satisfactory from the separation viewpoint. Whether or not this fact can be explained by the high tire operating temperatures, which would tend to maintain the low moisture content of the rayon, is a matter of conjecture. Not until careful work has been done to measure the average moisture in operating tires can this matter be clarified. For the present, then, the tire manufacturer must continue low humidity storage of rayon after dipping and drying, whatever be the reasons for the benefits which derive. The operation is costly and troublesome and is a distinct disadvantage for rayon as compared to cotton, nylon, and glass which do not require low humidity storage after being dried. Steel tire cord may require dry storage since brass-plating usually loses its effectiveness in bonding rubber to steel if allowed to remain long at high humidity. This statement must be classed as speculation until more experience is gained with large scale production of steel cord tires.

Calendering

The present "skim calendering" technique is made possible by the use of dip on the fabric. In "skim calendering" the rolls run at the same speed so that a thin layer of rubber is laid on each side of the fabric. "Friction calendering" where the rolls run at differential speeds in order to force the rubber into the fabric is necessary only for undipped cotton. Even the less vigorous action of "skim calendering" produces rather severe stresses in the cords which can result in changes in their elastic properties. The current trend is toward systems of automatic tension control in the calendering operation.

Cutting and Subsequent Storage

The calendered fabric is cut at the correct angle either by a Spadone or Rotary machine. This operation has little effect on the cord properties except that it exposes the cut ends to the air. Thus, localized moisture pickup is possible and some manufacturers play safe by storing the cut rayon fabric in a low humidity room up to the time of tire building.

Tire building and expansion

Practically all tires are now "drum built", that is, the cut fabric is laid on an approximately cylindrical drum of diameter slightly larger than that of the beads. Alternate plies are reversed as to the bias angle and are "tied in" to the beads by wrapping and "stitching." The latter operation consists of forcing the plies together with a rather sharp edged wheel. Any one watching the drum building operation will conclude that severe local stresses are imposed. The expansion of the cylindrical structure into approximately toroidal form results in further stressing of the cord body since the operation involves both the pressing of the beads toward each other and forming with the "airbag". A cursory glance at the building and expansion processes would suggest that a certain minimum stretch in the cord is essential; however, tires have been built with cords having a ten pound stretch of only one percent, and opinions of the minimum stretch desirable vary from one percent upwards.

Tire Curing

The final step in tire manufacture is vulcanization or "curing". Disregarding experimental "electronic curing" methods, the cure is accomplished in an iron mold which may be stacked with others in a pot heater filled with high pressure steam and with ram pressure maintaining closure of the molds. The newer "watchcase" mold has an individual cavity for a single tire and is heated by steam circulated through channels in the casting. Thus, the watchcase method of curing does not permit steam to come in contact with the tire and offers a theoretical advantage in the case of rayon tires. Whether or not the pot heater method actually results in appreciable moisture regain of the rayon body appears not to be settled. In general, the curing process is detrimental to the fabric only to the extent that the cord body is required to withstand a temperature as high as 300° F. for a few hours under rather small stresses. The damage thus resulting in rayon and nylon fabric is probably small; zero for glass and steel.

Tire Service Conditions

From the foregoing discussion of tire manufacturing processes it is clear that tire cords are called upon to withstand a variety of strenuous treatments which involve exposure to water and heat and subjection to appreciable mechanical stresses. In tire service, the cords must endure for longer periods of time high static and dynamic loads as well as elevated temperature with varying concentrations of oxygen and moisture present. The static inflation stress per ply can be calculated quite easily by straightforward geometrical considerations and, with a few simplifying assumptions, the static inflation load per cord can be obtained. Conventional tires (cotton and rayon) are designed for inflation loads of two to three pounds per cord. For four-ply steel cord truck tires, of course, the inflation loads may be much higher. The far higher dynamic fatigue stresses in the fabric, however, are not easily calculated but probably range from five to eight pounds per cord (1100/2) for rayon tires where the oven dry tensile strength at room temperature is only eighteen pounds. For a truck tire operating under severe but frequently encountered conditions, the temperature of the cord would be perhaps 280° F. and the moisture content probably not less than two percent (since two percent moisture is a customary building specification). As may be deduced from the curves of Figures 6 and 15 of reference *(1)*, the rayon cord with 2 percent moisture at 280° F. would have only 54 percent of the static tensile strength of that found in the oven dry, room temperature test. Hence, the static tensile of the cords at 280° F. and with 2 percent moisture would be only 10 pounds. When still further reductions in strength caused by dynamic fatigue are taken into account, it is clear that the factor of safety in cord body design is not very high, after all. It must also be remembered that, in addition to the above "normal" conditions in a truck tire, other even more severe stresses are sometimes encountered when a sharp object is met. These impact stresses account for many direct impact breaks and undoubtedly also serve to initiate other failures which take place more gradually in the form of "separations" and "flex breaks." Furthermore, the interply shearing stresses are known to be high and these must result in shearing and perhaps bending stresses on the cords which may be appreciable. As mentioned previously, the actual amount of moisture present and the amount of oxygen available in the cords of a typical operating tire are not known. However, it has been shown *(4)* that only slight chemical degradation takes place in cotton cords of tires run under severe road conditions; hence, it seems that the role of oxygen may be minor.

Required Properties in a Tire Cord

On the basis of the above description of the conditions of tire cord service, it is possible to list the desirable properties, or if there is objection to the use of the word "property", desirable characteristics of a tire cord. To begin with, on the basis of the most elementary thinking, it is desirable to have a continuous filament material in order to eliminate the possible effects of intra-fiber slippage. The next obvious property to consider is oven-dry strength which should be high (assuming that tires do not run under water and are not refrigerated.) However, the oven-dry strength at room temperature means very little if a severe temperature decay of tensile is found; for examples, acetate rayon and vinylidine chloride. In short, one of the greatest failings in our conventional routine testing technique is that most of the data are obtained at room temperature rather than at the operating temperature of a truck tire. On the other hand, a certain amount of wet strength is desirable, particularly from the standpoint of processing and the whole picture of manufacturing is much simplified when moisture effects are small for all the mechanical properties. But again, suppose we have a tire cord with magnificent static tensile at high temperature and with negligible moisture effects; we must ask a number of other questions which are not answered by conventional stress-strain tests. First of all, we might inquire concerning its flexibility. After all, ramie fiber can be employed to give a cord much stronger than cotton; yet the fibers are so brittle in bending that ramie has never been found practicable in a tire. This same comment applies to

glass fibers, as they existed in early experiments with tire cords. "Knot strength" or "loop strength" is a partial answer to the question of flexibility or its inverse, brittleness. However, a more complete answer is given by the tire itself where fatigue life is a prominent factor.

But what of fatigue life; why not measure it in the laboratory? The answer to this reasonable question is complicated by the fact that the conditions of flexing (strain, rate of strain, etc.) of a cord in a tire are not clearly known. Furthermore, the conditions of flexing vary from point to point along any individual cord; hence, care must be taken to specify whether the laboratory fatigue test should simulate sidewall, shoulder or crown fabric failures. Several very different types of cord fatigue testers have been developed *(5, 6, 7, 8, 9, 10, 11, 12)*. All of them have been exceedingly useful and several of them *(6, 8, 10)* are in regular use by major tire manufacturers. However, as concluded by Bradshaw *(10)*, none of them is very satisfactory and it seems safe to say that none of them has shown complete correlation with tire service tests. In fairness to the designers of these machines it must be recognized that their problem was very difficult; even indoor wheel tests of tires do not always correlate with road tests.

Another property which is vitally important but which is seldom measured directly is creep. Tire "growth" is a well known and serious phenomenon and can be directly predicted by properly conducted laboratory creep measurements (rate of extension under static inflation load at operating temperature). Only recently, however, has much attention been paid to creep of tire cords *(1, 5, 7, 13, 14)* and only two of these papers deal with the effect upon creep of a dynamic load superposed upon a static load *(7, 14)*. A common error in the past has been the confusion of "10 lb. stretch", as obtained with a conventional tensile testing machine, with creep; the two properties are not necessarily correlative.

The elasticity of tire cords has received very little attention. Thousands of conventional "10 lb. stretch" measurements are made every day without concern for the elasticity or reversibility of the stretch upon removal of load. The related factor which determines the amount of heat developed by the cord in the tire, hysteresis, has been given some attention under low speeds of deformation *(12)* but only lately have any results appeared on the far more appropriate dynamic hysteresis property *(14, 15)*.

The effects of moisture and temperature on yarns and cords have been discussed by numerous workers *(1, 2, 3, 5, 7, 14, 15, 16, 17)*. In one case *(1)*, the combined effect of temperature and moisture was studied in a manner which permitted plotting the tensile strength against temperature for a given moisture content (not a given relative humidity). From this study, it was clearly shown for cotton, rayon, nylon, and Fortisan cords that the effect of temperature (70°-300° F.) is to decrease the cord tenacity, providing the experiment is performed at constant moisture content, definitely refuting the popular misconception that rayon cords gain strength with increasing temperature. As stated in a previous section of this paper, it is a simple matter to determine the temperature at which cords operate in a tire but very difficult to determine what their moisture content is. Nevertheless, it can be asserted that low temperature and moisture coefficients are highly desirable both from the standpoint of processing and tire service. It also goes without saying that good chemical stability and heat conductivity are to be sought.

The adhesion problem with tire cords is difficult not only because of the chemical differences which exist between fiber forming materials and rubbers but also because the property is so difficult to measure. Static tests *(18, 19)* generally are employed to measure adhesion but there have been many instances where they failed completely to predict the dynamic adhesion which must be provided in an operating tire. As might be expected, a considerable amount of unpublished work has been done with the aim of developing a dynamic laboratory adhesion test but it is impossible that a completely satisfactory method has yet been achieved. The importance of adhesion and its measurement cannot be too much emphasized for it matters little if a cord excels in all other properties; if a satisfactory method of bonding it to rubber is impossible, any tire built with it will fail almost immediately upon being put in service.

Relative Virtues of Common Filament Materials in Tire Cords

In the preceding section some of the various desirable characterictics of a tire cord have been discussed. These properties are listed in the first column of Table I. In the remaining columns, ratings for current commercial cotton, rayon and nylon cords are given as well as representative glass and steel tire cords. These ratings are based upon published data, wherever definite quantitative results are available. Some of the characteristics, however, are not clearly defined (fatigue life, for example) and the ratings are based on what data do exist combined with commonly accepted tire service results. Others of the ratings, particularly those for glass and steel, are based on confidential data, the sources of which cannot be quoted. A rating of A indicates highest relative degree of excellence, B indicates next best, etc. Cotton is included only as a reference material. It should be remembered that these ratings are qualitative and some of them may not agree with opinions of others in the field; after all, there are several fatigue tests which do not agree among themselves and many varieties of tires built in different ways may yield different relative results for the various types of cords. The table is included then simply to stimulate discussion and further studies; it is hoped that it is correct in the main.

A few general conclusions may be drawn from this table. First of all, rayon, in spite of its low wet strength which makes tire processing complicated, has better dry strength, impact strength, fatigue life, and elasticity, as well as a somewhat lower temperature coefficient of strength than cotton. Apparently, these factors outweigh its lower flexibility and higher creep so that it is preferred for truck tires.

Nylon is still better than rayon in regard to strength, fatigue life, and moisture effect but is inferior in creep and has higher temperature coefficients. Its greatest weakness appears to be the dif-

TABLE I

Characteristics of Several Types of Tire Cord

Desirable Characteristics	*Low Stretch Cotton*	*Viscose Rayon*	*Nylon (Hot Stretched)*	*Glass*	*Steel (Brass Plated*
Continuous Filament	NO	YES	YES	YES	YES
O. D. Strength*	E	D	C	A	A
Wet Strength*	D	E	C	A	A
Impact Strength*	D	C	B	B	A
Flexibility	A	B	B	D	B
Low Stretch	O.K.	O.K.	O.K.	O.K.	O.K.
Fatigue Life	D	C	A	A	A
Low Creep	B	C	D	A	A
Elasticity	D	C	C	A	A
Low Hysteresis	D	C	C	A	A
Small Moisture Effect	INVERSE	E	C	A	A
Small Temp. Coefs.	C	B	C	A	A
Heat Conductivity	POOR	POOR	POOR	POOR	GOOD
Chemical Stability	B	B	A	A	A
Adhesion Status	GOOD	GOOD	FAIR	?	EXCELLENT

* Relative strength values calculated in terms of load per unit cross section.

ficulty in obtaining adhesion with an aqueous dip. It must be remembered, of course, that nylon is constantly being improved and that its deficiencies with respect to rayon may sometimes be removed.

The ratings for glass filament cord are a little out of date and may have to be revised radically in the near future. Glass cord, of course, is very strong and has no appreciable moisture or temperature coefficients. Its fatigue life in tension is good also but it is quite brittle in bending and in the past has given great difficulty from the standpoint of adhesion. Nevertheless, it has great potentialities and it will not be surprising to find it emerging as a worthy competitor of rayon and nylon in the near future.

Very little has been published on steel tire cord; yet that is one of the most urgent items on the development agendas of at least two major tire manufacturers. It possesses all the good properties of glass except higher specific gravity and, of course, cost. It has one property not possessed by any of the other cords, good heat conductivity. It has sufficient strength so that large truck tires can be built with only four plies which will outrun 12-ply rayon tires by a large margin. The adhesive problem has been solved by the use of brass plating in a manner which is very encouraging. In fact, there is no question that, if the cost of steel tire cord could be reduced to a reasonable level and if sufficient production could be made available, it would replace rayon in most of our truck tires; perhaps later in passenger tires.

Conclusion

In conclusion, it is hoped that this very qualitative discussion of tire cord problems will indicate what properties are really important in tire cord service and processing. The comparison of the common types of continuous filament cords may point the way to improvements in rayon and nylon which will make them better potential competitors of the glass and steel tire cords which now appear so promising. It should not be forgotten that cotton is still an excellent fiber, particularly for passenger tires where heat is not a factor. Furthermore, Fortisan has great possibilities as a tire cord but experience with it is rather meager and thus it could not be discussed in detail. It probably will be a long time before steel tire cord is in common use, even for premium tires. However, when that day comes, the textile industry should be ready with a new worthy competitive fiber or decide to accept steel wire as a special purpose textile filament and participate in its future development and production.

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Discussion

Mr. Walker: Dr. Dillon, on the question of producing adhesion between the cords and the rubber dip, you indicated that in the aqueous dipping technique, the practice had become to use resins with the rubber, and you mentionad specifically resorcinol formaldehyde.

I wonder if you could tell us a little more about it.

I might also ask about the work reported from Germany in that field, particularly with the isocyanates.

Dr. Dillon: That is, of course, a good question. I haven't gone into great detail in any of the items of this talk. I couldn't. These dips are of various types all up and down the scale. I suppose hundreds of different resins of various types are available and have been tried. Protein resins have been used with success in the country. Casein is used a good deal at present.

As far as the isocyanates are concerned, of course, they do give good adhesion, but if I remember correctly, they have never been handled well with an aqueous dip. They require a solvent dip of some kind, and as I pointed out, that scares away the practical tire man, after his experience with the old benzol dips.

Furthermore, I believe that I am correct in saying that there is a toxicity problem with the isocyanates. They certainly do give adhesion, with nylon particularly.

Mr. Woodruff: You didn't say anything about the price.

Dr. Dillon: I meant to say at the beginning of the talk that I wasn't going to talk about price. What always happens in the tire industry is that they start building a premium tire, with the new material, and somehow, eventually, the cost does come down. Of course, that is the general experience with all sorts of synthetic materials; the cost does come down eventually.

Question: What do you think is the future of ramie?

Dr. Dillon: We have made tires out of it. It is a beautiful, strong, natural fiber, stronger than cotton. However, it doesn't meet the requirements of brittleness, as far as my experience is concerned. Perhaps with proper extraction, to take some extraneous materials out of it, it could be made as flexible as the cotton fiber. So far, it hasn't shown much promise for tire cords.

Dr. Mosher: You didn't discuss the possibility of heat generation. I understand tires reach a temperature of 280 degrees F. What effect does that have on nylon?

Dr. Dillon: It does have an effect, and it gets you into grave problems. Nylon hasn't been used to any extent in truck tires, and is still in the experimental stage in that respect. Of course, the hot stretching method, as applied to nylon cords, is very beneficial in reducing creep. It is hoped that nylon can be made into a good truck tire material, just as was done with rayon.

Dr. Harold deWitt Smith: What is the approximate construction of the steel tire cords, and what size fibers or filaments or wires have they in them?

Dr. Dillon: Well, the present ones don't have a fine wire, Dr. Smith. They are made in constructions generally twisted 6 x 4. The gauge of the wire sometimes runs up to 10 mills or so. The surprising thing is that they are rather stiff material and to handle them you would say they wouldn't work in a tire. Of course, they are a little hard to handle. You have to work out building operations to handle them, but they seem to have the flexibility to do the job.

Chairman Fox: I am sure our audience joins with me in thanking these gentlemen for their excellent presentations this morning and this afternoon, culminating what I consider an excellent technical problem.

[Whereupon, the Friday Afternoon Session was adjourned at 5:10 o'clock.]

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New Developments in Pigment Printing and Dyeing Demonstrated at Lowell

IN a series of lectures on April 9, 1947 and May 6, 1947, the preparation of pigment printing pastes and the beneficial results of proper curing were demonstrated before the students of textile chemistry and dyeing at Lowell Textile Institute by James R. Redmond.

Mr. Redmond spoke under the auspices of the Student Chapter of the American Association of Textile Chemists and Colorists, as technical representative of the Textile Colors Division, Interchemical Corp.

The application of pigments from Emulsion Vehicles, Solvent Vehicles and Water Vehicles in roller printing and screen printing was explained in detail. Samples of printed fabrics of cottons, rayons, acetates, Aralac-nylon mixtures and glass were exhibited to emphasize important advantages listed by Mr. Redmond.

Mr. Redmond exhibited two types of high speed mixers and prepared a water-in-oil emulsion type print paste. A demonstration was made of the way in which proper curing results in optimum fastness to washing and scrubbing of fabrics which have been printed with pigment colors. This demonstration emphasized the fact that if the printing of pastes are properly prepared and the printed fabrics are dried and cured properly, the printed goods will be highly satisfactory.

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Annual Outing, Northern New England Section

THE 22nd Annual Outing of the Northern New England Section was held at the Andover Country Club, Andover,, Mass., on Friday, June 13th. Two hundred and fifty members and guests attended and enjoyed golf, horseshoe pitching, soft ball, cards, etc.

Winners of various events were as follows:

Golf

Class A: 1st Low Gross, Al Grant, 81; 2nd Low Gross, J. W. Bryant, 89; 3rd Low Gross, J. A. Bryant, 91; 1st Low Net, W. McElroy, 74; 2nd Low Net, W. Dewing, 79; 3rd Low Net, P. Graham, 81.

Class B: 1st Low Gross, F. A. Dushame, 84; 2nd Low Gross, W. H. Turner, 87; 3rd Low Gross, Joe Duffy, 89; 1st Low Net, Jim Cummings, 67; 2nd Low Net, J. Ormiston, 70; 3rd Low Net, A. Anderson, 71.

Class C, Kickers' Prize: 1st Low Gross, H. Belton; 2nd Low Gross, J. A. Morgan; 3rd Low Gross, W. R. Battersby; 1st Low Net, Harry Emmons; 2nd Low Net, Jim Gibbs; 3rd Low Net, F. Rhody and H. Logan (tie).

Guests:

1st Low Gross, Bill Fuller, 75; 2nd Low Gross, Pat Flynn, 90; 1st Low Net, Leo Vancourt, 65 (Handicap 35); 2nd Low Net, Tom Harrison, 70; 3rd Low Net, John McCarty.

9 Holes: 1st Low Gross, E. R. Laughlin, 56; 1st Low Net, A. M. Tabor, 59.

Longest Drive: Ben Batchelder.

Nearest to Pin on 5th Hole: H. E. Wieland.

Nearest to Pin on 11th Hole: Kirk Batchelder (Guest).

Hole in One: Hank Milton

Highest Gross: Wm. Smotlach, 208.

Most 6's: Clyde Roundtree.

Most 7's: Wally Perry and Ray Stevens.

Most 8's: J. A. Shea and J. Ploubides.

Most 9's: Frank Roach.

Kicker Prize: Art Staffon, (Guest).

Putting Contest: 1st, H. Buckley; 2nd, F. Dushame

Tennis

Singles winner, F. Robertson.

Horseshoe Pitching

1st Team, Al Johnson and Geo. Boehm.

Soft Ball

Winner, Pat Crowley's team.

Bridge

1st, Ed Laughlin and Barney Hillman.
2nd, Wallace Heintz and W. Dewing.

Cribbage

Geo. Linberg.

Seated at the head table for the dinner in the evening were the following: George O. Linberg, Wallace C. McElroy, Alfred T. Grant, Thomas W. Shoesmith, Lyman Billings, John F. Sheehy, Henry T. Rooney, Dr. Louis A. Olney, Harold W. Leitch, Edward S. Chapin, William W. Pennock, Martin H. Gurley, Jr., Herbert E. Wieland, Frank J. Robertson and Joseph E. Travers. Entertainment was furnished by Phil Clapp on the accordian and Jim Redmond on the cornet.

The committee in charge of the outing consisted of the following: *Chairman*—William W. Pennock; *Chairman Ex-Officio*—George O. Linberg; *Golf*— Wallace C. McElroy, Lyman Billings, Alfred T. Grant and Thomas W. Shoesmith; *Horseshoes*—Frank J. Robertson; *Soft Ball*—Joseph E. Travers; *Dinner*—John F. Sheehy and Henry T. Rooney; *Program*—Azel W. Mack and John F. Sheehy.

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CALENDAR

PHILADELPHIA SECTION
Meetings: September 26 (Kugler's, Philadelphia), November 8, January 16, 1948, February 27, 1948, April 9, 1948, May 21, 1948 (Bellevue-Stratford Hotel, Philadelphia).

NORTHERN NEW ENGLAND SECTION
Meetings: September 26, November 21.

SOUTH CENTRAL SECTION
Fall Outing, September 5th and 6th, (Lookout Mountain Hotel).

NATIONAL CONVENTION
October 23, 24, 25 (Congress Hotel, Chicago).

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NATIONAL CONVENTION

Congress Hotel
Chicago

October 23, 24, 25

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Annual Meeting of L. T. I. Student Section

ON the 7th of May, the annual meeting of the Lowell Textile Institute Student Chapter of AATCC was held. Chairman Rita P. Landry presided. In the course of the meeting Miss Landry outlined some of the accomplishments of the chapter this school year.

Bylaws and a Constitution had been drawn up, accepted and approved by the National Council.

A student chapter committee acting through Prof. E. E. Fickett had been instrumental in making arrangements so that at present many of our members are student affiliates of the American Chemical Society.

The annual reports of the standing committees were then requested.

Lawrence Gardner, chairman of the Membership Committee, gave his report. The work of his committee has been greatly facilitated by the support that has been given to the Student Chapter by the Northern New England Section. Their interest in our activities, shown by the visit of N.N.E. Section Vice-Chairman Frank J. O'Neil and Delbert Ray to our April, 1947 business meeting, and also shown by the N.N.E. Section May meeting which was held at the Lowell Textile Institute in honor of the student chapter, has created student interest, so that at present we have 80 members.

Robert Peirent, Chairman of the Publicity Committee gave his report. The success of the chapter activities is due in no small measure to the excellent publicity given those activities.

Albert L. Bianco, chairman of the Program Committee, gave his report. During the past school year eight programs were presented to the student chapter. The objective of the committee was to present a variety of subjects of interest to all members. The programs given were as follows:

1. December 11, 1946 — "The Industrial Methods of Soap Manufacture," by Bertil Ryberg of Procter & Gamble Co.

2. January 7, 1947—"Textile Machinery" by Ernest Cannity of James Hunter Machine Co.

3. January 30, 1947—"Petroleum Products" by R. B. Killingsworth of Standard Oil Co.

4. February 26, 1947—"Portrait of an Industry" technicolor movie of the Calco Chemical Co.

5. March 12, 1947—"Dyewood Products" by H. R. Tisdale of the American Dyewood Co.

6. April 9, 1947—"Printing with Pigment Colors" by James R. Redmond of Interchemical Corp.

7. April 24, 1947—"Chemical Additives for the Fabrication of New Textiles" by Stanley Brown of Monsanto Chemical Co.

8. May 6, 1947—"Printing With Pigment Colors" (continuation of the April 9 lecture) by James R. Redmond of Interchemical Corp.

The last order of business was the election of officers who will guide the chapter through the school year 1947-1948.

The newly elected officers are:

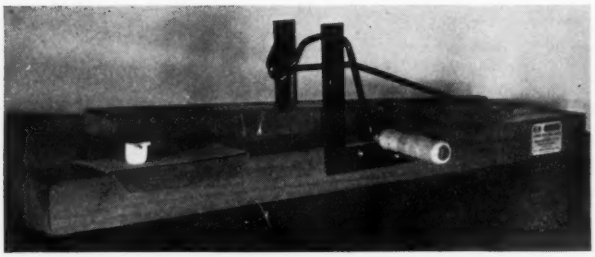
Chairman—Albert L. Bianco
Vice-Chairman—Peter J. McKone, Jr.
Secretary—Lawrence Gardiner
Assistant Secy.—Albert S. Hoyle
Treasurer—Miss Eleanor V. Foley.

Respectfully submitted,
John M. Roughan, *Secretary*.

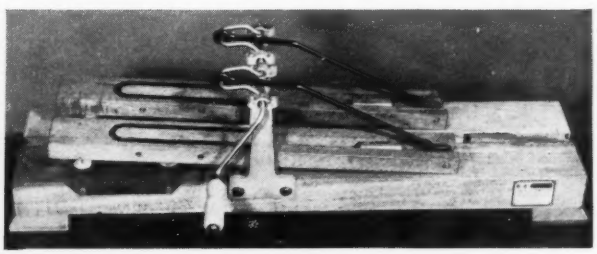
Crockmeters and Crockmeter Cloth

Revised Prices

Regular Crockmeter	$20.00
Regular Crockmeter (with automatic counter)	30.00
Duplex Crockmeter	50.00
Crockmeter Squares (500)	1.50
Crockmeter Cloth (96 x 100), by the yard	.75



Regular Crockmeter



Duplex Crockmeter

ABSTRACTS FROM CONTEMPORARY JOURNALS

Preparation, Dyeing and Finishing of the New Fibers

C. C. Wilcock, The Journal of the Society of Dyers and Colourists, page 41, Vol. 63, No. 2, February, 1947.

With the development of a satisfactory method for the desulfurizing and bleaching of continuous filament viscose rayon in cake form, dyeing in cake form has become the next logical development. Improvements in cake-dyed yarn, over skein-dyed yarn, are: ease of winding cakes, superiority in quality of cake-dyed yarn, coning of cake-dyed yarn directly from the cake, and the better condition of cake-dyed yarn. The application of direct cotton dyes to viscose rayon in cake form depends upon a uniform flow of liquor through all parts of the cake and the correct choice of dyes.

Cake dyeing with vat dyes is still a major problem and is due largely to the great affinity of reduced vat dyes to viscose rayon producing an uneven dyeing throughout the cake. Three possible methods for overcoming this difficulty are discussed.

Three classes of rayon piece goods requiring differnt treatment in dyeing and finishing are: (1) crepe fabrics, (2) flat rayon fabrics, and (3) spun rayons. Dyeing and finishing methods for these types are reviewed and new processes and treatments discussed, including the crease resistant treatment of spun rayon fabrics and its effects.

Drying equipment is one of the most important parts of the dyeing and finishing plant. This equipment, including hydroextractors, suction extractors, etc., is constantly being mechanically improved, however remaining the same in principle. Infra-red heating has been of some use for partial drying.

Although viscose rayon is still dyed mainly with direct cotton dyes, there is a growing demand for greater fastness. New compounds used as aftertreatments have improved the fastness of cotton dyes. Pigments incorporated in the viscose mass previous to the extrusion of the fibers produce colored fibers which are fast to wet processes as well as to light.

Nylon dyes similarly to wool and silk and has excellent affinity for the cellulose acetate rayon dyes and for a number of direct cotton dyes. An important property of nylon is the permanent "set" that may be imparted to it by the use of hot water or steam.

Vinyon can be dyed with the dispersed cellulose acetate rayon dyes in the presence of suitable assistants.

Casein fiber presents a new field in cloth construction since it is a protein fiber that can be processed on cotton machinery. Casein fiber has affinity for most classes of dyes.

Although there is little information on the dyeing of alginate fibers there are a sufficient number of dyes available which can be used to give a range of shades of satisfactory fastness to light and washing.

Dyeing Properties of Some Viscose Rayons

J. Boulton and J. Wardle, The Journal of the Society of Dyers and Colourists, page 8, Vol. 63, No. 1, January, 1947.

This paper is summarized as follows:

Results of an extensive study of the factors involved in the dyeing behavior of viscose rayon and in particular the effect of filament thickness are reported. The filament deniers of the fibers included in the study range from 0.3 to 9.3.

It is noted that since fine filament yarns present more surface area per weight of fiber than more coarse yarns, dyeing will tend to take place more rapidly.

Also, results showed that high tenacity yarns tend to dye more slowly.

In addition to differences in behavior during dyeing, yarns may exhibit differences in optical behavior in the dyed state.

The experimental methods used in the study for determining dyeing rates, diffusion rates and dye absorption are given. A method for determining the dye requirements to dye equivalent shades on yarns of different filament denier is explained in detail. Experimental data obtained are reported in both tabular and curve form.

Desizing

Batuklal C. Desai, The Indian Textile Journal, page 139, Vol. LVII, No. 674, November, 1946.

Desizing is an essential process for either yarn or cloth to obtain pliability, even results in the kier boil, and to insure a proper bleach.

Desizing enzymes may be classified as pancreatic, bacterial and malt enzymes. Close control of temperature and pH when using enzymes of these types are necessary for satisfactory results. The addition of common salt to the enzyme is recommended. Singeing aids the desizing process in that projecting fibers are removed. Care should be taken in selecting a desizing agent that will not lower the tensile strength of the fiber. Proper washing after the desizing operation is important in order to prevent the occurrence of permanent color markings during the dyeing process.

Tendering in Sulphur Blacks

"Colourist", The Textile Manufacturer, page 188, Vol. 73, No. 868, April, 1947.

Thorough oxidation of the dyestuff in the interior of the fiber is one of the most important means of preventing tendering of sulfur blacks.

Four methods of oxidation are reviewed with the advantages and disadvantages of each cited.

The use of ammonium sulfate, sodium bisulfite and sodium acetate and their influence in the application of sulfur blacks is discussed.

As a further measure in preventing tendering it is suggested that copper, bronze and brass dyebaths be avoided. Temperature control is an important point to be considered and as a general method it is recommended that dyeing start at 140° F. and rise slowly to the boil, rather than long boiling.

Some Problems Connected with the Colouration of Polyvinyl Chloride

James Haworth and B. N. Leyland, Silk Journal and Rayon World, page 30, Vol. XXIII, No. 273, February, 1947.

A brief review is given of the significance of color in the applications of vinyl resin compositions.

The components of a typical vinyl resin mix are discussed as well as methods for coloring vinyl resin compositions. Changes in different classes of pigments caused by the ingredients of a typical polyvinyl chloride compound and in particular the influence of the plasticizer are indicated. A list of pigments suitable for coloration of polyvinyl chloride is included.

Resist Printing Demands Close Attention to Details

T. N. Patrick, Textile World, page 139, Vol. 97, No. 3, March, 1947.

White or colored effects on a colored ground may be produced by means of resist printing using vat colors. The process consists of printing the resist paste and, if possible, drying before the application of the cover print.

Resist print pastes are of either a mechanical or a chemical nature with most white resist print pastes combining both properties in varying proportions.

Material to be resist printed should be thoroughly desized and treated with a wetting agent. Thickeners used in resist print pastes must be capable of absorbing large amounts of solid matter as well as

being readily soluble for ease in removing.

A recipe for a white resist under dark vat color cover prints is given and the components discussed.

Fluidity and penetrating power are requisites of a good paste. Penetration is also important in the cover print if it is to be applied to only one surface. For best results in cover printing on both sides of white resists it is necessary to print the goods three times.

The wet development and washing off of the prints require more than the usual care. Processing aids for these treatments are included.

Attack by Termites, Micro-organisms and Fungus on Cotton Fibres

Narhari H. Shah, The Indian Textile Journal, page 241, Vol. LVII, No. 675, December, 1946.

Material failure caused by mildew during the early part of World War II made necessary the improvement of existing fungi-proofing agents. Severe tests were devised for the evaluation of improved treatments. Test specifications for fungus-proofed goods are given.

Variations in test results due to natural biological reactions have caused considerable confusion.

Although many of the synthetic fibers support a fungus growth they are not necessarily damaged. However, for military purposes and for domestic consumption, complete inhibition is required. Several processing methods for fungi-proofing treatments are suggested.

The use of copper in conjunction with chromium and iron in mineral khaki dyeing is described and results of exposure tests made with yarn treated in this manner are given.

The effectiveness of 16 finishing treatments for resistance to micro-organisms and termite attack was determined. Results indicated that, in general, treatments protecting fabrics from attack by termites also were effective against microorganisms. However, some effective mildew-resistant treatments allowed slight attack by termites, and two allowed heavy attack. A complete table of results is included giving the treatment, degree of termite infestation, and micro-organism resistance in terms of change in breaking strength.

Air Bells Can Be Eliminated in Wool Raw-Stock Dyeing

Holzer Thuemmel, Textile World, page 125, Vol. 97, No. 3, March, 1947.

Air bells most frequently occur along the walls of the various types of pressure dyeing machines. Lofty springy wools are the greatest offenders particularly when well dried and firmly packed.

Although proper wetting out consumes time it is of great help. In this regard, on larger dye lots, it is recommended that the wool be used directly as it comes from the rinsing bowl of the scouring machine. Compensation for the water content of the wool must then be made.

The composition of the dye must be considered in the frequency of air bells. Higher temperatures should be used if possible. The use of the chrome bottom method in chrome dyeing is a positive means of eliminating air bells.

Automatic, Normal Incidence Solar Exposure Cabinet

P. J. Flynn and K. S. Campbell, Textile Research Journal, page 158, Vol. XVII, No. 3, March, 1947.

An exposure cabinet was devised for the exposure of cotton fabrics to solar radiation while maintaining the following conditions: sample surface perpendicular to the sun's rays, selective filtration of the radiation, isolation of radiation from other factors of weathering, equal and constant temperatures. Mechanization of the cabinet created a motion which kept the cabinet facing the sun throughout the day.

Detailed descriptions with figures and photographs are given of the exposure chamber, mount, driving mechanism, controls and instruments.

The cabinet has been operated successfully under extreme climatic conditions including wind of storm velocity and precipitation of 1½" per hour.

Knit-Cloth Dyehouse Thrives on Diversity

Irving Teplitz, Textile World, page 121, Vol. 97, No. 3, March, 1947.

The finishing of circular knit-goods requires a variety of equipment and machines. Although dye becks are necessary for dyeing pastels and colors, kiers are to be preferred where the poundage of cotton to be bleached is large. Squeeze rolls are recommended when weighting and non-curl treatments are given. The loop dryer enables rapid and economic drying.

The three prime requisites of a dyehouse are water, steam and waste disposal. The dyehouse should be located at a site which offers as much as possible of the three prime factors.

A cheap source of soft water is highly desirable. Stream or lake water may be soft. Well water and other hard waters must be treated and for this purpose the Zeolite method is most commonly used. Water pressure in the dyehouse should be at least 50 lbs. per sq. in. and delivered through a main having a minimum of four inches. Both hot and cold water should be available for reasons of economy.

Steam requirements can be determined on a basis of 50 h.p. of boiler capacity for each beck, kier and dryer. A spare boiler for emergencies is recommended.

Serious problems may be encountered with waste disposal and in the absence of other means a waste disposal system may be the final solution.

Stainless steel equipment throughout the dyehouse is advantageous. Labor saving devices and equipment should be used when possible. In regard to labor overhead and maintenance, a dyehouse is not a good investment unless relatively large quantities of goods are to be handled.

Recent Developments in the Use of Halogen Treatments

A. J. Hall, Textile Recorder, page 47, Vol. LXIV, No. 768, March, 1947.

Chlorine has been in use for years as a wool shrinkage control agent. Cheapness and availability in easily handled forms has led to nearly exclusive use of chlorine over bromine and fluorine. Chlorine has not been found satisfactory for producing completely non-felting, unshrinkable wool since extreme damage is incurred.

Essentials of a non-felting treatment are the reduction of the felting power to any desired amount including complete non-feltability, without fiber damage, a resultant soft handle and water repellency after treatment, excellent strength and elasticity, and the treatment shall not injure other fibers.

Investigations conducted on bromine and wool indicate that bromine will produce the same felting power reduction obtained with chlorine but with less fiber damage. Addition of bromine to a chlorination bath has the effect of preserving the wool. Brominated wools would probably dye more level than chlorinated wools.

Due to the reactivity of fluorine toward water and the formation of hydrofluoric acid, treatment of wool with this halogen involves the use of the gas under dry conditions.

Although hydrogen fluoride treated wool shrinks substantially less than untreated wool, fluorine gas is considerably more effective. As a result of these investigations it was found that treatment with hydrochloric acid increased feltability.

Although wool absorbs iodine it has no effect of felting power. There are three forms in which the iodine exists within treated wool: absorbed, combined and anionic.

Tables of comparative data are given.

• PATENT DIGEST •

PAUL WENGRAF

Water Repellent Compositions — Derivatives of Behenic acid G, 2, 0 2

Brit. P. 581,517-18)
(du Pont, Pikl, October, 1946, application Aug. 18, 1944)

The patent relates to amides of the behenic acid: $C_{21}H_{43}CO$. By transforming this high molecular acid into an amide, adding a suspension of paraformaldehyde in benzene and passing a stream of HCl at 80° C. under reflux a chloromethylamide containing three molecular groups of behenic acid is obtained:

$$C_{21}H_{43}\text{-}CO\text{-}N(CH_2Cl)\text{-}CH_2\text{-}N(COC_{21}H_{43})\text{-}CH_2\text{-}N(COC_{21}H_{43})\text{-}CH_2Cl$$

These products are wax-like compounds easily decomposed by solution in pyridine or other organic solvents and having permanent water repellent properties when applied to fibers and developed in the same way as for instance Zelan.

Reference: Behenic acid was not used up to date for water repellent purposes. High molecular compounds applied for waterproofing are for instance reported in U. S. Pat. 2,385,940, 145 (National Oil Products): high substituted salicylamide derivatives condensed with formaldehyde and secondary amines. U. S. Pat. 2,361,185 (du Pont): ocylether of methylolstearamide giving permanent water repellency.

Transparentizing — Using resin condensates G,2, 0 1

Brit. P. 581,785
(Heberlein, October 24. 1946. application October 25, 1943, Swiss Prior. October 26, 1942)

Generally transparentizing effects or organdie effects are obtained by treating fibers under certain carefully controlled conditions with cold, almost concentrated sulfuric acid. According to the present invention a transparentizing effect is obtained by treating natural or artificial fibers with a solution or emulsion, containing at least 5% of an organic solvent soluble, water insoluble amino ether resin for instance an alkylated urea-formaldehyde resin or an alkylated amino triazine formaldehyde resin, drying and fixing the condensate as usual. An example is the resin obtained by condensing hexamethylolmelamine with N-butanol. The transparency is said to be very good.

References: The specification gives some references regarding earlier work: Brit. P. 537,971 (Crease resistance obtained by applying an aqueous solution of an alkylether of methylolurea); Brit. P. 543,256 (Thioammeline condensates for the same purpose). Transparentizing of fibers with other resins (polystyryl resins, etc.) is well known as state in the same specification. Brit. P. 474,419 (Raduner): transparentizing with xanthate cellulose may be added to these references.

Chrome Dyestuffs Printing — Lake formed in the drying operation D, 2, 0 5

Brit. P. 582,089
(Durand & Huguenin, November 5, 1946; application, November 9, 1942, Ger. Prior, November 19, 1941)

While chrome dyestuff prints generally require a steam fixation of about an hour a printing formula has been developed according to which the chromic dyestuff lake is formed during the drying operation. The characteristic feature has to be seen therein that *no aqueous thickener* is used. The paste contains a water insoluble lacquer phase of about 700 g. (nitro cellulose lacquer plus butanol as a solvent) in 1000 g. total paste which can thus be considered as a water-in-oil emulsion of the Aridye type. Other ingredients are: one of the known Durand chrome dyestuffs such as Chromocitronine, Chromazurol, Modern Blue, etc., urea (described as printing assistant in Brit. P. 318,469), a water miscible solvent (of the "Cellosolve"-group), ammonium thiocyanate as an agent for splitting-off acid at higher temperatures, and a neutral chromium salt (sodium chromate). Drying at 130° C. is sufficient to combine dyestuff and chromium mordant which is really very surprising. Water-in-oil emulsions are applied in the Aridye processes where the dyeing components are oil-or-water dispersed, generally ready-made pigments. Thus a principal difference exists between the "Aridye" methods and this process. In some cases dyestuffs combined from two components are printed according to the Aridye method by placing one component in the oil-(lacquer-) phase, the other one in the aqueous phase, as for instance stabilized diazo-amino-compounds in the oil phase and alkali in the aqueous phase (U. S. Pat. 2,309,946, Interchem. Corp., Gessler, Pizzarello); or an emulsion of basic lead acetate in oil-soluble rosins in the oil-phase and alkali dichromate plus sulfuric acid in the aqueous phase, thus forming barium chromate *in situ.*

The corresponding U. S. Patent 2,416,-382 (inventor Von Niederhaeusern) has been granted Feb. 2, 1947.

Permanent Finishes — from resin condensates combined with rosinates G, 2, 01

Brit. P. 582,157
(Wiggins Teape & Co., November 8, 1946, application, January 5, 1945)
Brit. P. 582,235
(Wiggins Teape & Co., November 8, 1946, application, August 11, 1944)

Urea formaldehyde condensates of a syrupy consistency are poured into an alkaline sodium rosinate solution. At least one part of the rosinate must be mixed with 10 parts of the urea-formaldehyde precondensate. The compositions are said to be very stable. They can be used as permanent finishes becoming instantly insoluble in contact with alum or other slightly acid compounds. The second named Brit. P. 598,235 of the same company protects a similar process, using caseinates instead of rosinates.

References: An analogous invention is described in U. S. Pat. 2,386,321 (Levey Co.): formaldehyde resins are mixed with Copal rosin. U. S. Pat. 2,404,892 (Amer. Cyanamid): shellac added to aldehyde resins for finishing purposes.

Sizing — Polyvinyl alcohol, treated with magnesium compounds A, 4, 01

Brit. P. 582,641
(Imp. Chem. Ind., November 22, 1946; application July 28, 1944; U. S. Prior, July 29, 1943)

Polyvinylalcohol is well suitable for sizing nylon yarns but it is very water sensitive so that yarn sized with this substance and running through a humidified area in order to soften the yarn before knitting or weaving is covered with a gummy layer. The fabrics are in this case of a poor quality. The water sensitivity can be modified by adding some boric acid which has to lower and to control the water sensitivity of polyvinylalcohol. It has now been found that boric acid can be replaced by magnesium or barium chloride in these sizing compositions. The proportions are:

12 parts partly saponified vinyl acetate
4 parts $BaCl_2$
168 parts H_2O

References: Brit. P. 573,574 (Cal. Printers Ass., Lantz): permanent finishes produced from polyvinylalcohol, condensed with small amounts of formaldehyde. U. S. Pat. 2,411,322 (du Pont): polyvinylalcohol sizes mixed with urea-formaldehyde resins. U. S. Pat. 2,406,749 (du Pont): treatment of polyvinyl alcohols with boric acid in order to make them less soluble. Brit. P. 413,524 (I. G.):

small amounts of boric acid or boric acid compounds added to polyvinyl sizes in order to make them more resistant to water.

Vat Dyes — Reoxidizing with peroxide and tetraborate
C, 4, 02

Brit. P. 582,895
(Mathieson Alkali Works, December 2, 1946, application, February 29, 1944; U. S. Prior, February 26, 1943)

Instead of re-oxidizing vat dyes in the usual way it is proposed to run the dyed fabrics in a bath containing hydrogen peroxide and sodium tetraborate ($Na_2B_4O_7$). The liquid is maintained during the entire operation at a pH between 8 and 11. Sodium tetraborate acts as a buffer. The reaction with NaOH follows the equation:

$$Na_2B_4O_7 + 2\ NaOH \rightarrow 4\ NaBO_2 + H_2O$$

References: Can. P. 434,497 (Mathieson Alk. Works): re-oxidizing with hydrogen peroxide at a pH of 8.3—10 buffered with sodium bicarbonate with or without using sodium tetraborate, thus possibly identical with the present patent.

Water Repelling Finishes — Alkylolstearamide — glycollic acid ether
G, 2, 02

Brit. P. 583,031
(Imp. Chem. Ind., December 5, 1946, application, March 8, 1943)

The invention relates to surface active compounds obtained by etherifying the hydroxyl group of the methylol radical of organic amidomethylol compounds. According to an example glycollic acid is mixed with acetone. Methylol stearamide is added. The glycollic acid ether of the methylolamide has the OH group linked to the methylolhydroxyl. The products are water soluble. The aqueous solutions are filtered and evaporated. Cotton fabrics passed through an ammoniacal solution acquire a permanent water repellency on baking at 100-150° C. The same reaction is also carried out by reacting the methylolamide with lactic acid. The equation is as follows:

$$C_{17}H_{35}CONH.CH_2OH + CH_3CH\ OH—COOH$$

References: U. S. Pat. 2,220,508 (Rohm & Haas): permanent finishes are obtained on cellulose derivatives by treating them with aminomethylamides.

Scroop — Imparting to fabrics
F, 4, 02

U. S. Pat. 2,410,382
(Onyx Oil & Chem. Comp., Kaplan, October 29, 1946, application, September 12, 1942)

Scroop is, according to the definition in the present patent, "a characteristic feel or texture of fabrics, perhaps best characterized as the crisp rustle of silk or other fabrics." Weak organic acids have been used for some time to produce scroop. This treatment was applied after soaping the textile goods. The invention suggests to use instead certain esters of higher fatty acids applied in form of emulsions. The emulsions may also contain protective colloids, disinfectants and the like. An example mentions a composition, containing ethylene glycol monolaurate, gelatine, sodium—di-isopropylnaphthalene sulfonate (Nekal), sodium pentachlorophenate as a disinfectant and (77%) water.

Reference: U. S. Pat. 2,069,303 (Celanese) suggests to produce a scroop finish by impregnating a fabric with higher fatty esters of low-molecular alcohols. An example is stearic acid methylesters.

Water Repellent Finish — Silicon containing fatty amides
G, 2, 02

U. S. Pat. 2,415,017
(Montclair Research Corp., Mac Kenzie, January 28, 1947, application, Feb. 11, 1944)

Water repellent finishes containing higher amides alone or connected with formaldehyde are known. New compounds for water repellent purposes are formed by reacting higher fatty amides (or similar compounds such as imides or amidines) with formaldehyde and silicon chloride. These reaction products when condensed with tertiary amines have the character of quaternary ammonium compounds. They are readily dispersible in the impregnating liquid and decomposed later on the fibers. In carrying out this invention an acyl compound of a nitrogen group, for instance stearamide or stearylurea, is heated with paraformaldehyde and silicon chloride in an inert solvent for instance in dioxane. The mixture was stirred for two hours at 90° C. and pyridine was slowly added. By cooling the mass, a thick paste, completely soluble in water, was obtained. A fabric, impregnated with a 5% sodium acetate solution of this compound and baked at 160° C. for three minutes became water repellent (spray rating 100). After three standard dry cleaning operations the spray rating was still found to be 80-90. The preparation is also claimed to make the fiber receptive to dyestuffs, although no example is given relating to a dyeing process.

References: The U. S. Patents, assigned to Gen. Electric Co., 2,306,222 and 2,386,259 describe generally hydrophobing processes using silicon halides, tetrachlorides, or organosilicon halides. Methylolamides, without adding silicon compounds, are recommended as waterproofing agents in U. S. Pat. 2,361,185, 1944 (du Pont). An example is here the octylether of methylolstearamide.

Bleaching — Hypochlorites combined with alkyl-arylsulfonates
B, 1

U. S. Pat. 2,415,657
(Pennsylvania Salt Manuf. Co., Riggs, Pescko, February 11, 1947)

The invention relates to bleaching compositions consisting of hypochlorite and a wetting agent, having at the same time a good calcium salts dispersing ("sequestearing") power. The wetting agents are selected from the products of the Nacconol type, for instance Nacconol NR, Santomerse No. 1-3 or D, or Alkanol SA. The calcium dispersing agent is generally sodium pyrophosphate or sodium metaphosphate. A dry composition consists of 90-99% calcium hypochlorite (with or without adding an alkali pyro or metaphosphate) and 10-1% of an alkylaryl sulfonate.

References cited by the Pat. Off. to this specification amongst others:

U. S. Pat. 2,320,280, 1943 (Mathieson Alkali Works): Alkylsulfates or alkylsulfonates added to hypochlorite bleaching solutions.

U. S. Pat. 2,319, 697, 1943 (Mathieson Alkali Works): addition of tetraphosphate to hypochlorite.

U. S. Pat. 2,283,199, 1942 (Allied Chem.): Syntheses of alkylaromatic compounds of the "Nacconol" type—Preparation in general.

In the meantime U. S. Pat. 2,383,900 has been granted to Mathieson Alkali Works, protecting the use of additional wetting agents to bleaching baths. Some groups explicitly enumerated such as Igepon T, Mapromine, Gardinol, Modinal and Nacconol, a typical alkylated arylsulfonate.

Acetate Cellulose — Dyeings — Melamine aftertreatment
C, 4, 07

Brit. P. 581,176
(Soc. Chem. Ind., Basle, Oct. 3, 1946, application, March, 1943; Swiss prior, February, 1942 and December, 1942)

The *fastness to light* of acetate dyeings is considerably improved as claimed in the present specification, by an aftertreatment with a 1% melamine solution. It has to be emphasized that also titanium delustered and dyed fabrics which are particularly sensitive to light and known for fading in a short time acquire a better resistance to light by this treatment. The specification quotes as prior art Brit. P. 527,834 which relates to fumeproofing acetate cellulose fabrics.

References: Fumeproofing with melamine—formaldehyde condensates described in U. S. Pat. 2,403,019 (Celanese) or by melamine itself (without adding aldehyde) in U. S. Pat. 2,176,506 (Eastman Kodak).

Mechanical Degradation of Rayon Fabrics in Domestic Laundry Procedures[1]

MARY H. GRAYDON[2], DOROTHY M. LINDSLEY and JESSIE B. BRODIE

Department of Household Science, University of Toronto

I. Introduction

THE purpose of this study was to compare the various hand and machine washing methods used in the average home in laundering rayon as to their effect on tensile strength and their efficiency in the removal of soil.

A review of the scientific literature, published during the last fifteen years, revealed that research on the laundering of rayon has not kept pace with research in other fields in the development of this textile. It is therefore possible that present-day rayons may be laundered without damage, using more vigorous methods than are now recommended.

Previous work, done in other laboratories, showed that other factors besides mechanical action ([6, 7, 8]) contribute to the breakdown of rayons during laundering. These factors are the presence of hard water salts ([8]), and the use of hot water ([4, 5]), alkaline water softeners ([2, 7]), and bleaching agents ([5, 7]). Therefore in setting up this problem these factors were controlled through the use of Zeolite softened water at 100-105°F., a builder-free soap and no bleach.

[1] Submitted in partial fulfillment of the requirements for the degree of Master of Arts, University of Toronto.

[2] Research Assistant, Department of Household Science, University of Toronto.

II. Experimental Procedure

1. Materials

The fabrics tested were cellulose acetate satin, cellulose acetate taffeta, viscose spun slub crepe, viscose taffeta and cuprammonium crepe. The results of physical analysis on these fabrics are shown in Table I. Twenty-four inch lengths of each material were cut, hemmed, numbered and assigned to each of the washing series by a method of random sampling. To each test piece was attached a strip of the same fabric which had been soiled according to a standard method.

The cellulose acetate taffeta was carried through the two machine series only, while the cellulose acetate satin was used throughout the whole study since it was expected that a fabric of satin construction would show mechanical degradation earlier than one of plain weave.

In addition to the above mentioned fabrics, thirteen samples of specially dyed all-viscose fabric with strips of white desized cotton attached were laundered in the two machine series.

Standard home laundry equipment was used throughout the experiment. A gyrator washing machine with wringer attached was used for machine washing and hand washing was done in an enamel basin. Zeolite softened water and a soap free from builders and fillers were used throughout.

2. Washing Procedure

Test pieces of each fabric were washed in the following manner:

A. Hand Washing

Series I. Hand washing, hand squeezing, towel rolling.

Series II. Hand washing, hand wringing.

B. Machine Washing

Series III. Machine washing, machine wringing.

Series IV. Soaking, machine washing, machine wringing.

As shown in Table II all washings and rinsings were done at a temperature of 100-105°F. and each washing consisted of one five-minute suds in a 0.2 per cent soap solution followed by three two-minute rinses. In Series I and II washing was done by hand using a dip, dip, squeeze motion. This was standardized by means of a metronome to 24 per minute. An attempt was made to remove the same amount of moisture from each test piece prior to drying.

Test pieces in Series III and IV were machine washed and machine wrung and in Series IV they were soaked in a 0.2 per cent soap solution for one hour prior to washing.

TABLE I
Physical Analysis

Material	*Construction*	*Type of Yarn* Warp	Weft	*Yarn Count (per inch)* Warp	Weft	*Twist (Number and direction per inch)* Warp	Weft	*Denier (per yarn)* Warp	Weft	*Filaments (per yarn)* Warp	Weft	*Weight (ounces per square yard)*
1. Cellulose Acetate Satin	Satin Weave (4/1) 2L	single	single	240	100	4.43Z	3.80Z	55	75	13	20	2.55
2. Cellulose Acetate Taffeta	Plain Weave	single	single	95	65	2.20Z	2.50Z	100	100	40	40	2.11
3. Viscose Taffeta	Plain Weave	single	single	94	65	2.23S	0.29S	100	100	40	40	2.11
4. Cuprammonium Crepe	Plain Weave	single	single	98	79	45.2Z	0.57Z	100	100	65	65	2.63
5. Viscose Spun	Plain Weave	single	single	68	48	....	....	273	245	..	..	5.15

TABLE II
Washing Procedure

	Hand Washing Series I Series II	*Machine Washing* Series III Series IV*
Water	5 quarts	12 gallons
Soap (neutral)	0.2% solution	0.2% solution
Temperature	(100-105) °F.	(100-105) °F.
Washing time	5 min.	5 min.
First Rinse	2 min.	2 min.
Second Rinse	2 min.	2 min.
Third Rinse	2 min.	2 min.

* In Series IV test pieces were soaked in a 0.2% soap solution for one hour prior to washing.

From each series, one test piece of each fabric was removed for testing after 5, 10, 20, 30, 40 and 50 washings. The test piece to be removed was chosen by a method of random sampling. In Series III and IV undyed unsoiled cotton fabric was added to keep the load at four pounds air dry weight.

3. Testing Procedure

After 5, 10, 20, 30, 40 and 50 washing periods, fabrics were tested for tensile strength, soil removal and color fastness.

Tensile strength determinations were done by the Grab method using a Scott Tensile Strength Tester[1]. Deterioration was measured on both wet and dry samples since previous work done by other investigators indicated that strength losses often are more readily detected in the wet state.

The removal of soil from the soiled strips was measured by light reflection using a Hunter Multi-Purpose Reflectometer.

Fading of color in the specially dyed viscose samples was measured by visual comparison with unwashed samples of the original material. Staining of the attached white cotton strips was judged in the same manner.

III. Discussion of Results

Tables III to VII inclusive present the average tensile strength values* after each washing period for each of the five fabrics tested. Tensile strength results were statistically analyzed comparing strength losses between the series after each of the washing periods and over the 50 washes.[2] Only the dry tensile strength values were statistically analyzed since the greater variation in results occurred there.

This analysis indicated that hand wringing produces no greater weakening than gentle hand squeezing and towel rolling. Similarly, machine washing brings about no greater tensile strength losses than hand laundering. Even soaking, for a one-hour period, prior to machine washing, does not cause any greater deterioration.

* Average of 5 breaking tests.

TABLE III
Average Tensile Strength in Pounds
Cellulose Acetate Satin

Number of Washings	*Series I*		*Series II*		*Series III*		*Series IV*	
	Wet	*Dry*	*Wet*	*Dry*	*Wet*	*Dry*	*Wet*	*Dry*
Warp								
0	25.9	39.9	27.8	44.5	27.6	37.3	27.4	44.4
5	28.7	39.3	28.4	41.3	28.5	42.6	26.7	43.2
10	30.3	41.7	24.7	40.6	27.5	42.3	27.0	40.3
20	25.2	43.2	24.9	39.0	29.8	42.3	27.7	42.4
30	27.4	42.9	29.9	42.7	29.4	42.9	29.2	42.9
40	28.8	40.7	28.9	42.3	27.6	41.7	25.7	40.1
50	27.8	41.0	25.9	42.1	27.1	40.6	26.2	39.2
Weft								
0	17.4	26.6	19.3	30.8	17.8	27.4	17.8	28.8
5	18.6	24.3	18.8	28.3	18.7	26.6	18.5	27.9
10	19.3	29.2	19.6	29.2	18.6	28.3	19.0	28.7
20	18.9	26.6	17.3	24.3	17.4	26.0	17.8	25.8
30	19.4	29.7	19.1	28.4	18.2	25.8	16.9	21.7
40	18.3	25.5	19.6	28.7	16.2	23.7	15.2	20.3
50	18.1	25.6	18.8	30.3	16.3	24.7	14.5	20.0

An examination of the average tensile values showed a greater loss in the viscose spun than in the viscose filament fabric but this may be due in part to the uneven yarn construction of the spun material. The cuprammonium fabric showed the greatest overall loss in strength but the initial wet strength value for this material was the lowest of the five fabrics tested. The cellulose acetate satin showed no greater strength loss than the cellulose acetate taffeta indicating that satin fabrics of firm construction require no extra care in laundering.

The current methods of soiling fabric produce uneven application of soil to

TABLE IV
Average Tensile Strength in Pounds
Cellulose Acetate Taffeta

Number of Washings	*Series III*		*Series IV*	
	Wet	*Dry*	*Wet*	*Dry*
Warp				
0	20.6	27.6	30.6	38.6
5	17.4	32.8	21.3	33.7
10	22.6	33.9	20.7	32.3
20	20.9	31.6	19.8	31.7
30	21.8	29.6	21.0	32.4
40	19.9	33.0	19.7	27.5
50	19.4	31.6	19.4	27.3
Weft				
0	12.1	19.0	21.5	27.8
5	15.4	23.8	15.8	23.4
10	18.5	22.9	14.5	21.6
20	14.9	22.6	12.8	19.8
30	14.5	21.0	15.0	20.5
40	13.8	21.0	13.3	18.0
50	13.7	18.7	14.2	19.5

TABLE V
Average Tensile Strength in Pounds
Viscose Taffeta

Number of Washings	*Series I*		*Series II*		*Series III*		*Series IV*	
	Wet	*Dry*	*Wet*	*Dry*	*Wet*	*Dry*	*Wet*	*Dry*
Warp								
0	16.9	36.0	18.9	40.4	18.1	35.6	17.6	40.9
5	20.0	40.0	16.8	41.4	18.7	42.4	17.9	41.1
10	16.3	40.4	15.4	39.3	16.8	38.9	17.3	39.7
20	16.7	40.6	16.2	38.6	17.8	37.8	17.1	38.3
30	16.8	38.9	17.7	37.8	17.5	37.8	17.0	39.4
40	17.4	37.9	18.3	39.6	16.6	36.2	18.0	39.1
50	15.2	35.8	15.4	37.2	15.1	36.9	15.3	36.6
Weft								
0	9.3	27.9	12.4	31.4	12.0	28.4	13.1	34.4
5	14.0	32.5	13.2	31.2	11.3	30.2	14.4	32.8
10	12.9	31.2	12.2	29.8	10.5	28.6	14.2	30.4
20	12.3	33.0	14.5	32.2	13.6	32.5	12.8	31.2
30	14.5	31.6	13.2	29.4	12.8	30.4	9.2	25.5
40	11.1	27.7	15.4	33.3	7.9	22.8	12.8	30.7
50	12.3	32.9	13.2	31.6	10.2	25.6	13.0	31.0

TABLE VI
Average Tensile Strength in Pounds
Viscose Spun

Number of Washings	*Series I*		*Series II*		*Series III*		*Series IV*	
	Wet	*Dry*	*Wet*	*Dry*	*Wet*	*Dry*	*Wet*	*Dry*
Warp								
0	20.4	53.7	23.0	71.0	24.7	61.4	21.8	71.6
5	16.9	38.7	20.6	48.9	19.0	46.7	21.6	46.3
10	17.0	40.0	17.1	42.9	18.5	45.3	19.1	47.0
20	17.3	39.2	16.0	42.0	18.9	41.5	18.7	42.0
30	16.6	35.3	16.5	37.2	18.0	39.5	17.8	39.1
40	15.1	38.8	15.4	37.2	15.9	39.9	16.8	36.8
50	16.8	39.3	13.8	38.8	15.8	36.7	14.8	34.6
Weft								
0	14.6	38.4	15.2	43.0	17.0	43.7	15.6	42.8
5	15.2	35.6	16.8	37.4	15.2	34.9	15.9	38.3
10	15.7	35.7	16.7	36.1	15.0	38.7	15.3	36.1
20	16.7	35.0	15.4	40.5	14.7	35.5	14.5	34.6
30	16.7	37.1	14.4	33.3	15.6	35.5	16.4	38.1
40	15.2	39.4	15.8	35.6	15.2	35.4	15.2	35.4
50	16.0	36.5	14.4	38.5	13.5	33.0	14.6	35.4

TABLE VII
Average Tensile Strength in Pounds
Cuprammonium Crepe

Number of Washings	Series I		Series II		Series III		Series IV	
	Wet	Dry	Wet	Dry	Wet	Dry	Wet	Dry
Warp								
0	12.1	26.1	16.2	33.3	16.1	28.4	16.6	32.9
5	9.2	19.4	9.2	22.6	9.3	24.3	8.6	23.5
10	9.5	21.1	8.9	21.1	9.4	24.3	9.0	23.8
20	9.3	20.6	8.2	21.2	8.6	21.3	7.9	19.7
30	9.1	20.0	7.1	18.3	9.3	21.3	9.4	20.5
40	9.2	20.2	7.3	19.4	7.8	18.5	7.4	17.9
50	6.5	17.2	6.6	16.1	6.9	17.0	6.2	16.4
Weft								
0	17.6	32.5	17.4	37.4	17.5	33.5	18.3	37.8
5	14.6	28.0	11.9	31.1	16.7	33.8	14.9	33.2
10	16.0	31.0	14.3	34.2	17.6	33.7	13.3	30.6
20	14.9	29.1	12.4	32.6	15.6	32.4	12.3	27.4
30	16.5	31.1	13.3	28.6	14.0	26.9	13.5	28.9
40	14.0	28.6	11.8	27.8	12.8	25.8	11.1	25.4
50	10.5	26.1	13.9	25.3	12.6	23.4	10.8	25.5

rayon materials and the resulting fabric cannot be considered standard. For this reason the results could not be statistically analyzed. The percentage of soil removed after each test period was calculated. Table VIII gives the percentage soil removal after 50 washings for each of the fabrics studied in each series.

TABLE VIII
Per cent Soil Removal
After 50 Washing Periods

	Series I	Series II	Series III	Series IV
Cellulose Acetate satin	100.0	34.4	91.2	100.0
Cellulose Acetate taffeta	....	...	89.4	96.8
Viscose taffeta	81.4	82.4	81.5	85.3
Viscose spun	86.9	78.9	90.1	94.7
Cuprammonium crepe	93.3	86.2	97.4	100.0

An examination of these results showed certain general trends. Hand squeezing and towel rolling was more efficient than hand wringing and this was thought to be due to the more complete moisture removal by the former method. Machine washing and wringing removed more soil than hand processes while soaking, prior to washing, brings about the highest percentage soil removal.

The results obtained with the specially dyed viscose samples showed that on the whole, the dyes stood up under extensive machine laundering even when the material was soaked before washing. However, in every case fading of color and staining of attached white cotton were both greater and apparent earlier when the material was soaked.

IV. Summary and Conclusions

Five types of rayon fabric were given two series of 50 machine washing treatments and two series of 50 hand washing treatments using Zeolite softened water in a 0.2 per cent neutral soap solution of 100-105°F.

A statistical analysis of the tensile strength results for the five rayon fabrics tested indicated that all four laundry methods compared favorably since no one method produced significantly greater tensile strength losses; repeated washing, however, did cause a slight decrease in tensile strength.

The results of this investigation indicate that present day rayon fabrics may withstand more vigorous laundry methods than are now recommended. The harshest of the four home methods tested, soaking, machine washing and machine wringing, produced no greater degradation than any of the other three methods and proved to be the most efficient in soil removal.

It would seem, therefore, that for most complete soil removal and ease and speed of laundering, white rayon fabrics similar to those studied may be machine washed after a preliminary period of soaking. Soaking is not advised for colored rayons but otherwise they may be laundered in the same manner.

Acknowledgment

Grateful acknowledgment is made to the following companies for their donations of sufficient materials and supplies to carry out this study: Courtaulds Limited, for the cuprammonium crepe, spun viscose crepe, viscose and cellulose acetate taffetas; Canadian Celanese Limited, for the cellulose acetate satin; Lever Brothers Limited, for the pure soap; and W. J. Westaway Company Limited, for the Zeolite Water Softening Equipment.

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TRADE NOTES • NEW PRODUCTS

• Forty-ninth Commencement Exercises, Lowell Textile

The Forty-ninth Commencement Exercises of Lowell Textile Institute, Lowell, Massachusetts, were held in Southwick Hall on Monday, June 2nd.

The address of welcome was delivered by President Kenneth R. Fox and the commencement address by Dr. Milton Harris. Dr. Harris chose as his subject "The Role of the Technical Man in the Textile Industry". He said in part:

"The textile industry is an extremely diversified, complex, gigantic industry, an industry so large that even the largest textile organizations that have been built up over many years must be considered as pygmies with respect to the whole. The industry is so large that along with its allied branches such as the apparel industry it probably employs more people than any other industry; it is one of the largest consumers of chemicals.

"The industry is today in a period of rapid transition—transition from one of the oldest and most basic industries in the world, developed strictly through empirical experience—to a new type of industry which is rapidly harnessing the latest scientific developments, which recognizes new principles of management, which is experimenting with new types of organizations.

"In a recent survey of 104 companies and institutions employing 40,000 engineers, personality was listed as the most important consideration in hiring, with scholastic record and indicated promise of development tied as the second consideration. Experience was fourth, and 'salary requested' was put at the bottom of the list. Why is personality rated so high? It is rated high because modern industry in all its phases has become extremely complex—it can now only be operated by teams of men and, with few exceptions, the day of the rugged indi-

vidualist or the individual inventor is past.

"Soon you will become an employee of some company. At this stage you have little to offer but vigor, interest, ambition and a wonderful education. Nevertheless, every organization is willing and anxious to make an investment in you. The task of justifying these investments is squarely before you—you can best do this by using everything that this grand institution has given you as a basis for becoming a student of the problems that will confront you in your future work, by making every effort to become an effective and co-operative worker on any team you join."

Awards were made as follows:

Honor Medal, National Association of Cotton Manufacturers—to Julian F. Kosowicz, Lowell, Mass.

Phi Psi Award—to Julian B. Klashman, Cambridge, Mass.

Louis A. Olney Book Prizes—

Graduating Student—to Joseph H. Rosenbaum, Lowell, Mass.

Second Year Students—first prize to Herbert M. Lachut, Dracut, Mass; second prize to Charles R. Sheehan, Lowell, Mass.

First Year Students—first prize to Allan R. Wirth, Lawrence, Mass.; second prize to Frederick M. Hornyak, Philadelphia, Pa. These students hold New England Textile Foundation Scholarships.

The following students are eligible for membership in Tau Epsilon Sigma, scholastic honor society, on the basis of their standing for the first three years:

Samuel L. Clogston, Lowell, Mass.
Howard M. Helland, Whitinsville, Mass.
Albert G. Hoyle, Lowell, Mass.
Peter J. McKone, Jr., Lowell, Mass.
James F. O'Donnell, North Chelmsford, Mass.
Melvin Siegel, New York, N. Y.
Ray M. Spofford, Haverhill, Mass.

Following is a list of graduates:

Master of Science in Textile Chemistry
George R. Boule, Lowell, Mass.
Carlos Gorenstin, Brazil
Ramanarayan G. Manudhane, India
Alvaro O. de Mandonca, Brazil
Arthur J. Moreau, Lowell, Mass.
Kurt Politzer, Brazil
Devalpalli, H. Rao, India
Ademar Vieira da Rocha, Brazil
Champaklal C. Shah, India
Kirpal Singh, India
Jose F. Valente, Brazil

Master of Science in Textile Engineering
John C. Busby, Jr., Salisbury, North Carolina
Horst E. Gaensly, Brazil
Yu-Husuan Liu, China
Chia-Ti Yu, China

Diploma in Cotton Manufacture
Archavir Nalbandian Melkonian, Chile

Diploma in Wool Manufacture
John D. Campbell, Andover, Mass.
David B. Dolge, Hazardville, Conn.
Archavir Nalbandian Melkonian, Chile
Warren M. Pettengill, Jr., Albany, N.Y.

Bachelor of Science in Textile Chemistry
Claude H. Allard, Lowell, Mass.
Bernard Baum, Brookline, Mass.
John J. Bernard, Lowell, Mass.
John E. DeKalb, Chelmsford, Mass.
Edwin Gottlieb, Brooklyn, N. Y.
Henry J. LaFrance, Jr., Tyngsboro, Mass.
George O. Langlais, Lowell, Mass.
Philip E. MacLean, Westford, Mass.
Stillman D. McMahon, Lowell, Mass.
Paul J. Martin, Lowell, Mass.
John W. Merrill, Tewksbury, Mass.
Jackson W. Morton, Boston, Mass.
Walter H. Perry, North Andover, Mass.
Richard E. Petersen, Concord, Mass.
Pauline F. Riordan, Lowell, Mass.
Joseph H. Rosenbau, Lowell, Mass.
Ann E. Sargent, Lowell, Mass.

Bachelor of Science in Textile Engineering
Alan H. Cherenson, Lowell, Mass.
Sidney Fishman, Brookline, Mass.
Blanche A. Gaulin, Lowell, Mass.
Isabel F. Haggerty, Lowell, Mass.
John L. Hallett, Jr., Boston Mass.
Stanley L. Helfgott, Brightwaters, N.Y.
Kalman Kaplan, Everett, Mass.
Julian B. Klashman, Cambridge, Mass.
Julian F. Kosowicz, Lowell, Mass.
Leonard S. Lauten, New York, N.Y.
Harold Leshowitz, Brooklyn, N. Y.
Robert G. MacIntyre, Lowell, Mass.
Martin B. Marcus, Brookline, Mass.
Alex M. Miller, Perth Amboy, N. J.
Robert E. Porter, Ware, Mass.
John H. Queeney, Scituate, Mass.

• Officers, PTI Foundation

Re-election of Colonel Millard D. Brown to the presidency of the Board of Trustees of the Philadelphia Textile Institute Foundation has been announced by Emil R. Pohlers, Executive Director.

The Foundation is a non-profit educational corporation established to raise and administer funds for the 64 year old Philadelphia Textile Institute.

Theodore B. Hayward, former secretary of the Board was elected first vice-president and Russell C. Osborne was elected secretary. Alban Eavenson was re-elected second vice-president; W. Lyle Holmes, Jr., was re-elected treasurer.

Four members of the Board were re-elected to three-year terms. They are: Benjamin Gibbs, Gerome Leonard, Russell C. Osborne, and Edward H. Rakestraw. Robert A. Smith, newly-elected president of the Philadelphia Textile Institut Alumni Association, was elected to membership on the Board.

• Pyruvic Aldehyde

Pyruvic Aldehyde, or methyl glyoxal, is a new chemical for industry now available in limited quantities from Carbide and Carbon Chemicals Corporation. Larger scale production is anticipated in the near future, as new uses are established. Pyruvic aldehyde is shipped as an approximately 30 per cent aqueous solution, which is a stable, yellow liquid. This compound contains two highly reactive carbonyl groups, and undergoes most reactions typical of aldehydes. It has been suggested for the synthesis of pharmaceuticals, dyestuffs, resin polymers, and other industrial chemicals. With alcohols, pryuvic aldehyde forms dialkyl and tetraalkyl acetals, and with glycols high-boiling polymeric acetals can be made. With polyhydroxyl compounds it forms cross-linked, water-insoluble resins. It is a convenient source of pyruvic acid, important intermediate for the pharmaceutical cincophen (2-phenylquinoline-4-carboxylic acid). Pyruvic aldehyde is also useful in insolubilization reactions with protein materials such as animal glue, casein, and zein.

Form 6823, containing further information, can be obtained from Carbide and Carbon Chemicals Corporation, 30 East 42nd Street, New York 17, N. Y.

• Pass Resolution on Funds for PTI

A resolution endorsing the civic campaign to raise funds for a new school plant for the 64 year old Philadelphia Textile Institute was approved unanimously by the Master Dyers Association, meeting at the Philadelphia Country Club, Spring Mill, on June 17th.

Edward H. Rakestraw

The resolution was offered by H. T. Greenwood, Jr., president of the Globe Dye Works, and of the Master Dyers Association.

Edward H. Rakestraw, 312 Brentford Road, Haverford, campaign chairman, described the organizational work that has been accomplished to date and outlined

• Heads the Spool Cotton Company

Herbert Grandage, former executive vice-president of The Spool Cotton Company, who has been elected president of the company, succeeding William B. Bachof who recently died.

Mr. Grandage joined the company in 1921 and was elected vice-president in 1937. He is a past chairman of the New York Section of the AATCC.

plans for the future. He pointed out that if the funds raised in the civic campaign were only a small fraction of the annual contribution of the textile industry to payrolls and purchasing power in the Philadelphia area, the campaign would go over the top.

Lindsey H. Mason, a member of the Board of Trustees of the Philadelphia Textile Institute Foundation, president of the S. and M. Dye Works, Inc., 3419 Richmond Street, described the educational opportunities offered by the Institute and the importance of textile education to the future of the industry.

• MIT Textile Research Course

The Massachusetts Institute of Technology announces a summer program in "Principles of Textile Research" for four weeks, beginning August 4 and continuing through August 29, 1947, under the direction of Professor E. R. Schwarz.

The program will include lectures, demonstrations illustrated by experiments, slides and moving pictures together with laboratory exercises in the physical analysis of textiles. It is offered for the benefit of laboratory technicians, teachers of household economics, students from textile schools, and others interested in textile research.

In addition to a discussion of the fundamental principles involved in the techniques of textile research from the physical and optical standpoint, work will also be given in the presentation of data (both in tabular and graphical form), report writing, and in the application of such statistical techniques as the analysis of variance, quality control, significance testing, and correlation analysis (including rank correlation).

The complete facilities of The Slater Memorial Textile Research Laboratory will be available, together with the other research facilities of the Textile Division.

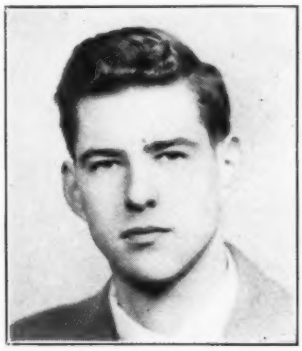
So far as possible, the material will be presented in a manner to be of interest and value to the teacher of these and allied subjects, to the laboratory technician, to the executive who must interpret such results for the benefit of his organization, and to the student who seeks an up-to-date orientation course in physical and optical analysis of textiles.

Tuition is $125 including a $5 registration fee.

The laboratory group will be limited in size, in order that facilities may not be overtaxed; hence early registration is suggested.

Minimum prerequisite requirements are high school graduation including physics, chemistry and mathematics thru trigonometry. College training will be helpful.

• Onyx Representative



Philip E. MacLean who has been appointed technical representative in the New England area for the Onyx Oil & Chemical Co., Jersey City, N. J.

He is a graduate of Lowell Textile Institute, with over three years' overseas service with the Navy as engineer officer on amphibious landing ships. He has had considerable industrial experience in textiles, with particular reference to resins and their application in emulsion form.

Mr. MacLean will spend some time in the Onyx plant and in field work in textile mills before assuming his duties in the New England textile field around August 1.

• Definized Exhibit at International Exposition of Textiles

Shown above is the exhibit of the Definized Process of rayon shrinkage control at the International Exposition of Textiles held at Grand Central Palace, New York, the first half of June. The exhibit highlighted actual branded merchandise from the women's wear, men's wear and children's wear field that had been shrinkage controlled by the Definized process.

It is stated that the Definized process makes it possible to obtain complete shrinkage control on all types of rayons and combinations without leaving foreign substances on the fibers. Currently 10 finishers are licensed to apply the Definized process to fabrics. It was developed by Alrose Chemical Company of Providence and is distributed by the Aqua-Sec Corporation, 1450 Broadway, New York.

• Promoted by Monsanto

Howard J. Heffernan, assistant general sales manager of Monsanto Chemical Company's Merrimac Division at Boston, Mass., who has been appointed division general sales manager to succeed Dr. Lester A. Pratt, who became assistant to the division general manager on May 16. Mr. Heffernan, a native of Hoboken, N. J., joined the Merrimac Chemical Company in 1926 as a salesman in the New York area. He became New York branch manager in 1929 when Merrimac became part of Monsanto. He was transferred to Everett in 1945 on his appointment as assistant general sales manager.

Application should be made to Professor E. R. Schwarz, Room 3-309, Textile Division, M.I.T., Cambridge 39, Mass.

Dormitory facilities for men are available during the summer, and dining facilities are also available on the Institute campus.

• Calco Announces Major Promotions

Appointment of Kenneth H. Klipstein as an Assistant General Manager in charge

Kenneth H. Klipstein

of the Development Department and V. E. Atkins as Manager of Manufacturing has been announced by the Calco Chemical Division, American Cynamid Company.

V. E. Atkins

It was also announced that Ames B. Hettrick, formerly an Assistant Manager of the Pigment Department, had been

Ames B. Hettrick

named Assistant Manager of Manufacturing, and that L. M. Phelps will assume the post of Plant Production Manager, Bound Brook Plant, formerly held by Mr. Atkins. F. W. Zipf was named Assistant to the Manager of Production.

K. H. Klipstein prior to his new appointment was Director of New Products Development. He is a graduate of Princeton University where he obtained his A. B. degree in 1921 in economics and an M. A. degree in chemistry in 1924. He joined the family firm of E. C. Klipstein & Sons, South Charleston, West Virginia, manufacturers of dyes and chemicals, which was later purchased by Calco in 1933. Coming to the Calco organization, Mr. Klipstein has since been engaged with all phases of product development work.

Mr. Atkins came to Calco in 1936 as an Assistant Divisional Manager. Prior to joining the Calco organization, he had been a Vice President and Factory Manager of the Seiberling Rubber Company. He was graduated from the Ohio Wesleyan University in 1914 and joined the B. F. Goodrich Company where he became Assistant Manager of the Hard Rubber Division.

• Named Manager of New Drew Affice

W. H. Kirkpatrick, who has been appointed manager of the new sales office of E. F. Drew & Co., at 805 Woodside Building, Greenville, S. C. Mr. Kirkpatrick, formerly connected with Westvaco Chlorine Products as divisional sales manager, will call on the textile industry in the southeast.

The new office is being established to serve this territory adequately with Drew's new synthetic esters, wetting agents, synthetic detergents, softeners, sulfonated oils, soaps and other specialties. Warehouse stocks will be kept in a central location for efficient and convenient service to the Southwestern mills.

• Nopco 15-Year Club

Nopco Chemical Company, Harrison, N. J., which this year observes its 40th anniversary, has initiated 18 new members into its "15-YEAR CLUB." Membership in the Club is restricted to those who have been with the organization 15 years or longer. The induction ceremonies marked the 10th anniversary of the group, which now boasts a membership of 119, or over 10% of the total number of all employees.

Charles P. Gulick, President, presented the newcomers with gold service pins, and not the least of their awards is a third week vacation which is granted all employees in their 15th and subsequent years of employment. Highlight of this year's ceremonies was the presentation of gold watches to 4 other employees in recognition of their 25th anniversaries.

Mr. Gulick, founder of the business, tops the list of Club members having passed the 40 year milestone. G. Daniel Davis ranks second among Nopco officers in point of service (31 years), followed by Albert A. Vetter (28 years), Ralph Fechseler (26), Thomas A. Printon (25), Perc S. Brown and George H. Faux with 20 years each.

• Technical Service Representative, Hooker Electrochemical Co.

James S. Walker, who has been appointed technical service representative of the Hooker Electrochemical Co. Mr. Walker, a graduate chemist of Union College, joined the Hooker staff in 1940 and has had experience both in research and plant operations. He was engaged in process supervision prior to his recent appointment.

With the Niagara Falls office of the Hooker company as his headquarters, Mr. Walker will handle problems related to the shipping, storing and handling of all Hooker chemicals. The chife emphasis of his work will be placed on the element of safety in the handling of Hooker products in the consumers' plants.

• Larger Quarters, Fallek Products

Fallek Products Company, Inc., manufacturing chemists, exporters and importers of chemicals and dyestuffs, announce their expansion of business has made necessary a move to larger quarters. They are now located on the 30th floor of 165 Broadway, New York 6, N. Y. Their new telephone is BArclay 7-7939.

• Chicago Manager, Stein, Hall

Stein, Hall & Company, Inc., announces that effective June 23, 1947, Kenneth Arnold was appointed manager of their Chicago Sales Branch Office.

Mr. Arnold has been associated with Stein, Hall & Company, Inc., since 1933 and for the past twelve months as assistant manager of the Chicago office.

Oscar Westerlund who has been associated with the company for many years in Chicago will continue as assistant manager of the Chicago branch.

• Res-O-Dors

The unpleasant odors that have come from the use of plastic coatings on a variety of commodities, from tablecloths to raincoats, can be overcome and replaced by a slight but pleasing fragrance, according to a bulletin just issued by Givaudan-Delawanna, Inc., of New York, specialists in aromatic materials.

The agents which the Givaudan laboratories have created for this purpose, known as Res-O-Dors, are said to be inexpensive and easy to use and will not affect the plastic material. It is claimed that they have been tested in many consumer products, and that the odor appeal has been found to be attractive to the buyers.

Among the products for which the Res-O-Dors would be suitable, the Givaudan bulletin states, are plastic coatings for refrigerator food covers, lettuce bags, umbrellas, stuffed toy coverings, shower curtains, mothproofing bags, bathing caps, and artificial leather handbags, briefcases and automobile upholstery.

• Booklet on Textile Specialties

The American Cyanamid Co., 30 Rockefeller Plaza, New York 20, N. Y., has recently released a booklet on "Textile Specialties" which presents a wide range of products including wetting and surface active agents, sulfonated oils, softeners, penetrants and dyeing assistants, sizing compounds and water repellent compounds.

The description of each product has been purposely confined to a brief and condensed summary of its use and advantages, in order that the booklet may prove a useful and ready reference. There is also included a description of the functions of the centralized Research Laboratories in Stamford, Conn.

Copies of the booklet are available upon request.

• Join National Starch

Leo T. Slattery of Chicago and John C. McCauley of Philadelphia have joined the sales staffs of National Starch Products Inc.

Mr. Slattery, a graduate of the University of Chicago, is with National's Chicago division, while Mr. McCauley, alumnus of the University of Virginia, is on the sales staff of the Philadelphia division.

• Awarded Honorary Doctor's Degree

C. M. Whittaker, president of the British Society of Dyers and Colourists, was awarded the honorary degree of Doctor of Science at the University of Leeds, Leeds, England, on May 14.

The presentation address was made by Professor J. B. Speakman who pointed out that Mr. Whittaker has given almost 50 years to the cause of chemistry in the dye making and dye using industry, having entered the dye making industry in 1899 after training in the Chemistry and Dyeing Department of the Yorkshire College.

He entered the rayon industry in 1920 and soon established himself as an authority on the dyeing of rayon. His investigations, which were published in the scientific journals and embodied in successive editions of his book on "Dyeing with Coal Tar Dyestuffs" were the basis of the science of dyeing successive varieties of rayons.

Mr. Whittaker is a member of the Dyestuffs Advisory Licensing Committee and the Dyestuffs Industry Development Committee of the Board of Trade and served as Chairman of the British Colour Council in 1935 and again during 1939 to 1944.

• Visit National Starch Plants

R. M. L. Francis, managing director of National Adhesives, Ltd., Slough, England, and O. B. Meijer, managing director of National Zetmeelindustrie, N. V. Veendam, Holland, both firms affiliates of National Starch Products Inc., New York, who have recently completed scheduled visits to National's plants and offices throughout the United States and Canada. Mr. Francis is at left.

The companies in England and Holland, between them, make most of the products for the extensive export trade conducted by National in Europe and other continents.

Mr. Francis and Mr. Meijer attended various staff and sales conferences while in this country, and visited Meredith Simmons & Co., Ltd., Canadian affiliate, in Toronto and Montreal.

He received the Gold Medal of the Society of Dyers and Colourists in 1945 and the Honorary Fellowship of the Textile Institute in 1946. He was elected president of the Society of Dyers and Colourists in 1946 and re-elected in 1947.

• Definized G Process

A new, wholly-chemical process that, it is claimed, makes it possible for the first time to control shrinkage in both rayon and cotton textiles with a single formula is announced by Mark Weisberg, president of Alrose Chemical Company, Providence, R. I., developers of the process.

Called "Definized G," to differentiate it from the Definized process of shrinkage control for rayons only, the new process is said to be equally successful when applied to cottons, rayons, and cotton mixtures with rayons and acetates, regardless of weight or width. It will be distributed, as is Definized, by the Aqua-Sec Corporation, 1450 Broadway, New York.

Successful commercial runs on thousands of yards of fabrics at several finishing plants are said to have shown that residual shrinkage on both cotton rayon mixtures is restricted to within 1 per cent when the "Definized G" process is used.

It is stated that these tests have shown also that tensile strength and abrasion resistance of cottons and rayons are unaffected by "Definized G," and the process can be used with equal success on white or dyed goods.

Technically, the process is based on the use of glyoxal combined with newly discovered catalysts that do not discolor the treated fabrics.

The process, which is available to all Definized rayon shrinkage control licensees, is applied on standard rayon finishing equipment. The glyoxal solution and the new catalysts are applied on a padder and dried. To complete the reaction the fabric is then given a "cure" for three to six minutes at temperatures ranging from 270 to 350 degrees Fahrenheit. The next step is to wash, dry and frame the fabric to a predetermined finished width.

The chemical used in the "Definized G" process differs from the caustic Definized method in that it modifies the chemical structure of the fabric and thus "sets" fabric dimensions.

The new process will not replace the caustic Definized process, according to Mr. Weisberg, but rather will supplement it—and is successfully used when cotton and rayon mixtures are involved. For rayon and wool mixtures, the caustic Definized process is recommended.

Patents have been applied for on the "Definized G" process.

• Director, PTI

Bertrand W. Hayward has been appointed director of the Philadelphia Textile Institute effective July 1st. This is a new office in the developing of a wider scope of activities. Dean Richard S. Cox becomes his associate in the broadening aspect of industry's requirements.

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POSITION WANTED: Colorist, for Screen Printing. Age 26, 8 years experience on all types of Dyes and in Printing. Highly specialized on Acetates and Rayons. Write Box 253.

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POSITION WANTED: Textile Chemist, two years experience, research graduate Cambridge University. Prefer position in Metropolitan area. Write Box 256.

POSITION WANTED: Sales or technical service position wanted by Dyer and Chemist several years experience wool, cotton, rayon, unions. Write Box 258.

POSITION WANTED: Experienced Dyer on cotton, rayon, acetate piece goods. Some bleaching and finishing experience. Write Box 260.

WANTED: Salesman with knowledge of textile specialties, living in the South, with experience and personal contacts to cover the South for an old established firm. State age, selling experience, and other details. Very good salary to the right man. Write Box 261.

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FOR SALE—One Single Arc Atlas Weatherometer. One model LHD-EF Atlas Launderometer complete, including B-1 pre-heating loading table. One U. S. Testing Company Flammability Tester No. 40 with combing device No. 35. Write Box 265.

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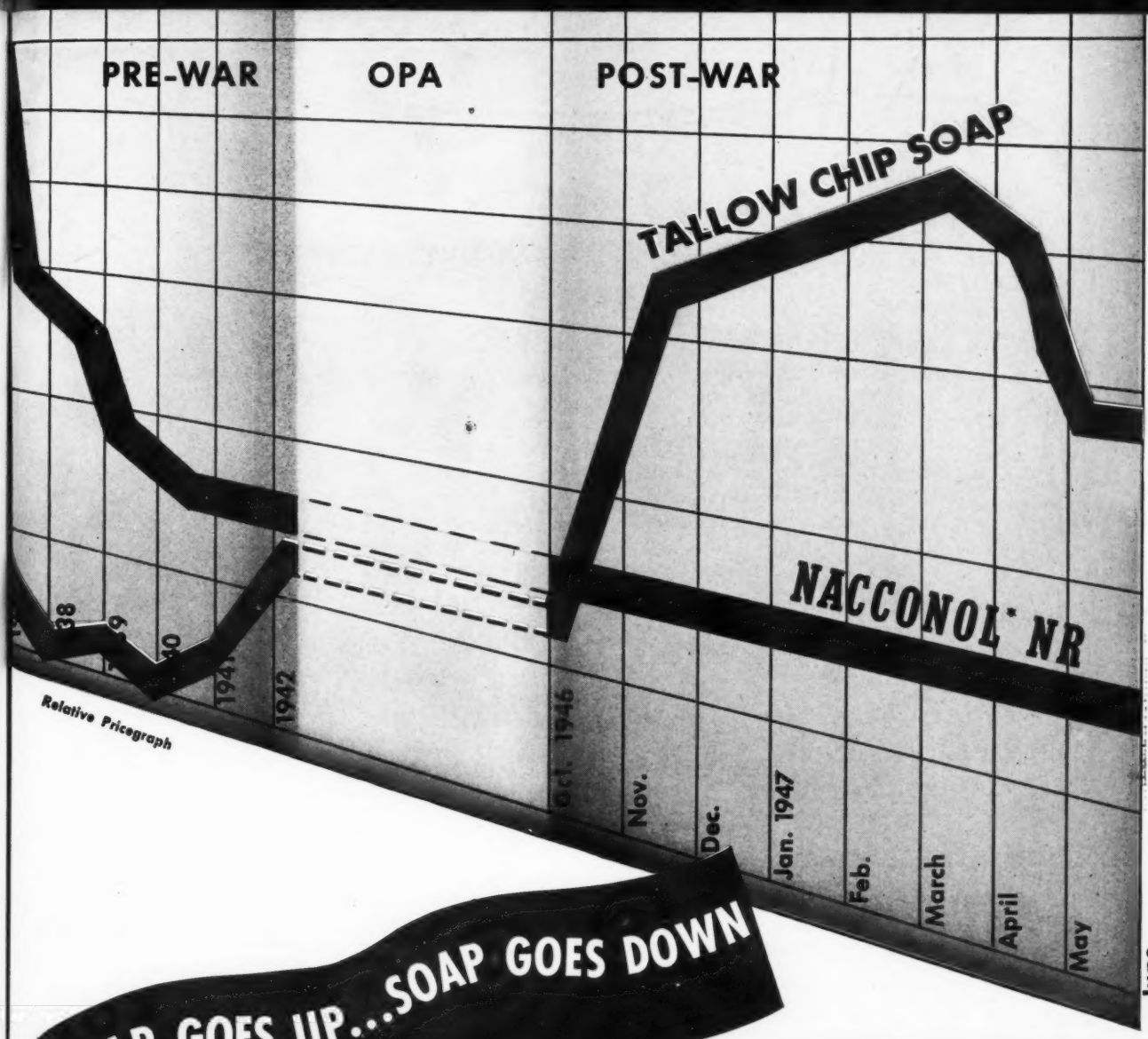

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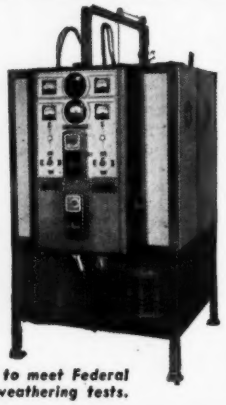

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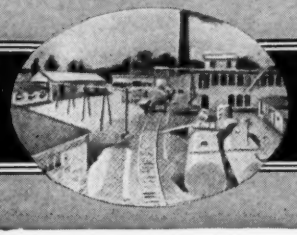

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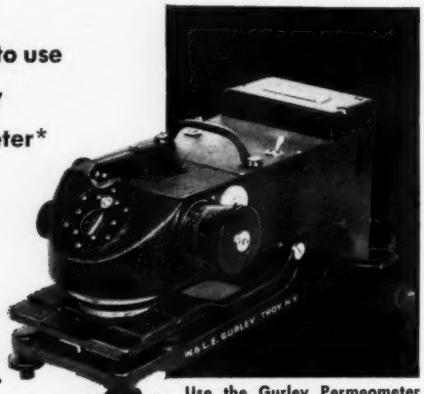

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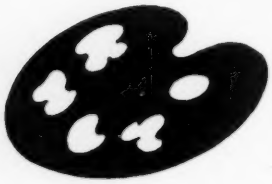

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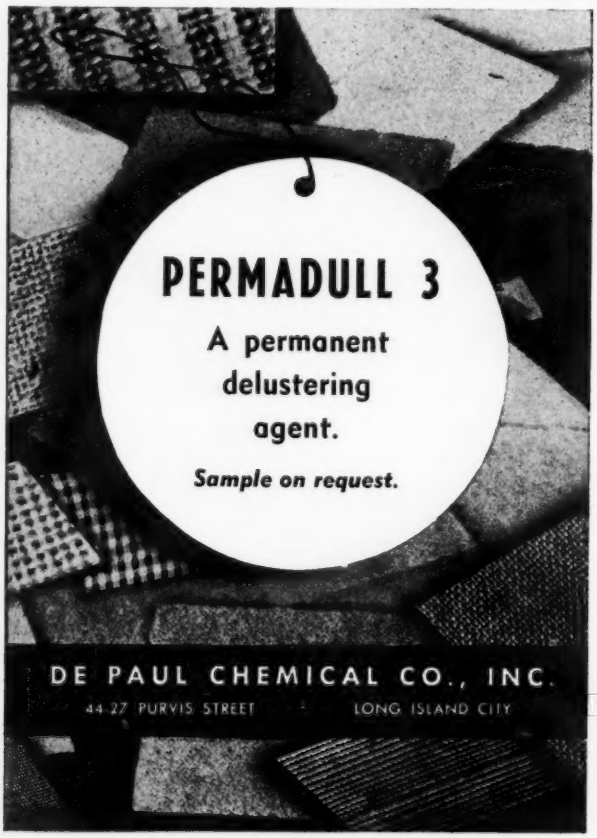

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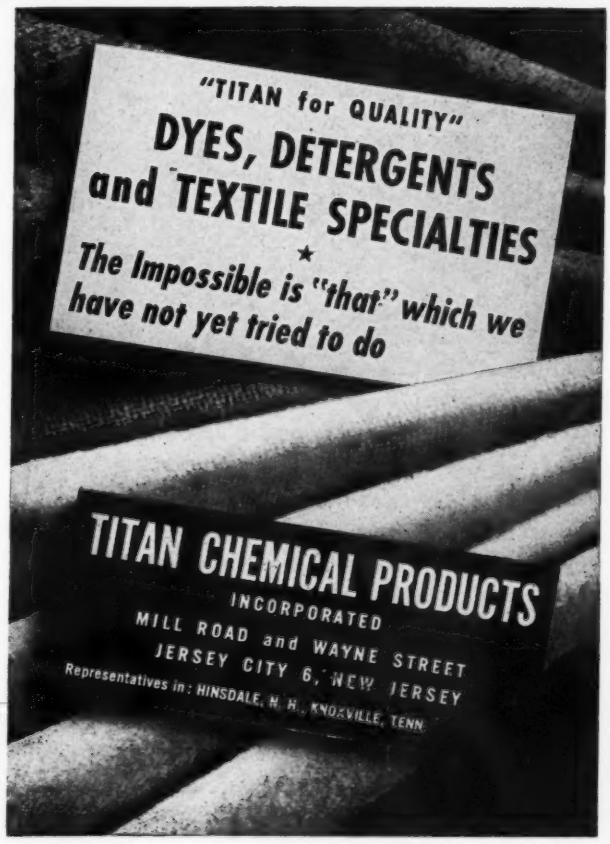
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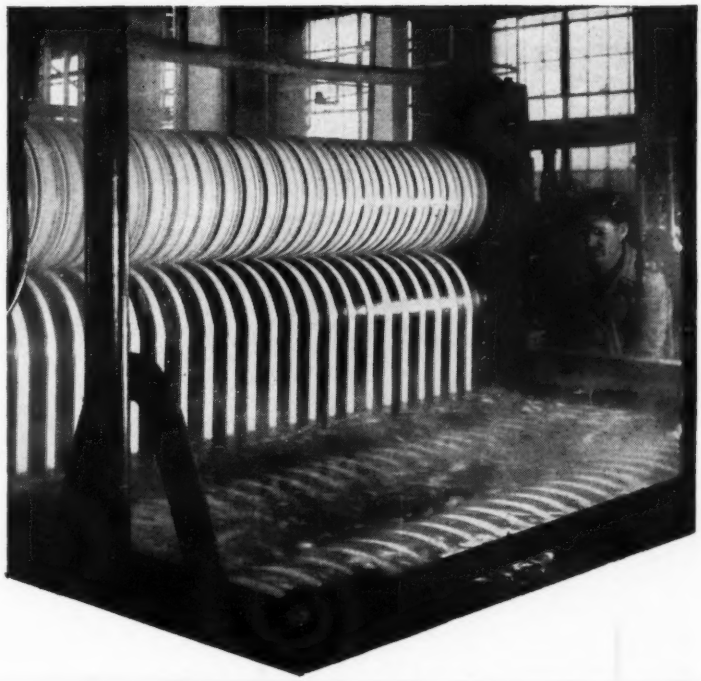
Dyeing Assistants



Dyeing textiles is a chemical process . . . and the quality of your dyeing can be no finer than the quality of the chemicals you use. Dyers who want to be sure of their choice of dyeing assistants and other basic textile chemicals always—

SPECIFY "GENERAL CHEMICAL"

Select your basic textile chemicals from these General Chemical Company Products

- Aqua Ammonia
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- Hydrofluoric Acid
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- Glauber's Salt
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- Sodium Bisulfite, Anhydrous
- Sodium Hyposulfite
- Sodium Metasilicate
- Sodium Silicate
- Disodium Phosphate, Anhydrous
- Tetrasodium Pyrophosphate
- Trisodium Phosphate
- Sodium Sulfide
- Oxalic Acid
- Chrome Alum
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- Sodium Sulfite, Anhydrous
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- Nitric Acid
- Mixed Acid
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- Lead Acetate
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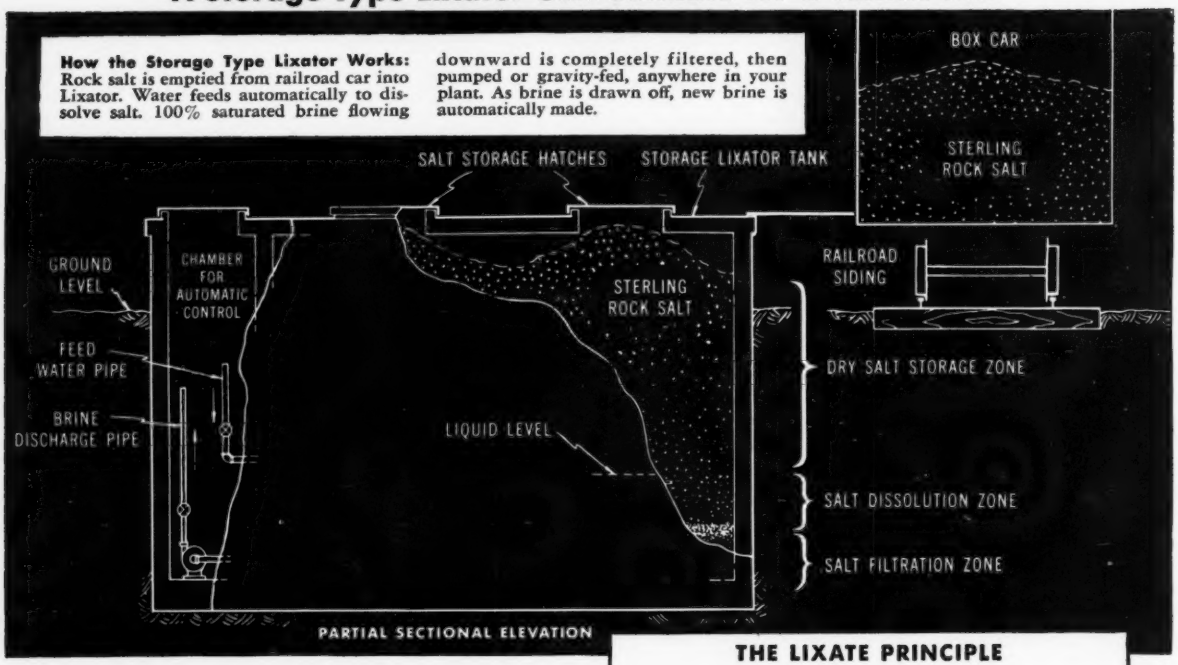
A Storage Type Lixator Unit Suitable for a Textile Mill


How the Storage Type Lixator Works: Rock salt is emptied from railroad car into Lixator. Water feeds automatically to dissolve salt. 100% saturated brine flowing downward is completely filtered, then pumped or gravity-fed, anywhere in your plant. As brine is drawn off, new brine is automatically made.
BOX CAR
STERLING ROCK SALT
SALT STORAGE HATCHES
STORAGE LIXATOR TANK
GROUND LEVEL
CHAMBER FOR AUTOMATIC CONTROL
FEED WATER PIPE
BRINE DISCHARGE PIPE
STERLING ROCK SALT
LIQUID LEVEL
RAILROAD SIDING
DRY SALT STORAGE ZONE
SALT DISSOLUTION ZONE
SALT FILTRATION ZONE
PARTIAL SECTIONAL ELEVATION

DAN RIVER MILLS' Storage Type Lixator Produces 8000 Gallons of Saturated, Filtered Brine per hour

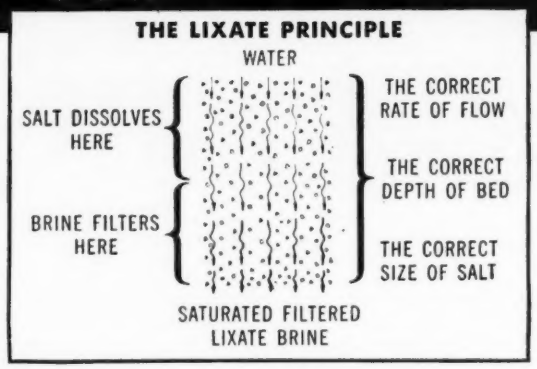
"It Paid for itself in One Year"

Says W. B. CARROLL,
Superintendent of Dyeing

Once, salt had to be handled *eight different times*—even before it was dissolved by hand labor into brine—at Dan River Mills, Riverside Division, Danville, Va.

Today, Sterling Rock Salt is unloaded from railroad cars into an 8000-gallon-per-hour Storage Type Lixator right beside the tracks. From the Lixator, 100% saturated, clean, crystal clear, self-filtered brine flows automatically by pipe to the nearby stock dyehouse... *and 3,700 feet across the Dan River to the suiting dyehouse.*

The entire installation paid for itself within a year, thanks to operating economies made possible by the expertly designed, International Storage Type Lixator.



With long years of experience behind them in cooperating with the textile industry, International engineers are thoroughly familiar with the uses of salt as brine in dyeing machines and vats and for regenerating zeolite water softeners. In every use the Storage Type Lixator eliminates salt handling and waste. Its brine making capacity always equals your needs. It is a completely automatic system, delivering the exact quantity of brine required at every point of use.

Full details of how the Storage Type Lixator can save you man-hours and money and boost your production efficiency will gladly be furnished. Simply fill out and send the attached coupon.

INTERNATIONAL SALT COMPANY, INC.
Dept. ADR-7, Scranton, Pa.
Gentlemen:
I would like complete information about the Storage Type Lixator.

*Name*_____

*Firm*_____

*Street*_____

*City*_____ *State*_____

The **LIXATE** *Process*
Reg. U. S. Pat. Off.
for making brine
INTERNATIONAL SALT COMPANY, INC.
Scranton, Pa.

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. . ."that lovely, well-dressed ladies always wear fine, exquisitely finished hosiery. *And,* that smart ladies insist upon dull sheerness, extra strength, elasticity, increased run and snag resistance, spot repellency and lasting beauty in all their hosiery, whether it is of web-like delicacy or a heavier daytime weight."

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